SPECIFICATIONS

VOLUME 1 PROJECT MANUAL

Contract Documents

December 11, 2025

South Winnipeg Recreation Campus Phase 1

City of Winnipeg

Tender No. 63-2025B

15 Ruth Crossing & 25 Ruth Crossing

Winnipeg, MB

Consultant Project No: 220007

City of Winnipeg Project No: 2020-127

Diamond Schmitt Architects

384 Adelaide Street West, Suite 100

Toronto, Ontario

M5V 1R7

Tel: 416-862-8800

1.1 Document Responsibility

.1 Refer to Project Manual, Section 00 01 10 - Table of Contents, for indication of document responsibility (DR). Abbreviations for entity responsible for document preparation are as follows:

.1 A - Denotes documents prepared by Architect.

.2 C - Denotes documents prepared by Civil Engineer.

.3 CW - Denotes documents prepared by City of Winnipeg.

.4 E - Denotes documents prepared by Electrical Engineer.

.5 L - Denotes documents prepared by Landscape Architect.

.6 M - Denotes documents prepared by Mechanical Engineer.

.7 S - Denotes documents prepared by Structural Engineer.

.8 SD – Denotes documents prepared by Sustainable Design (LEED) Consultant.

.2 Professional seals if applied next to company names in the project directory (below) govern only those specification sections and schedules identified by the corresponding document responsibility (DR) abbreviation in Section 00 01 10.

1.2 Project Directory

.1 Owner (the City):

The City of Winnipeg
Assets & Project Management Department
Municipal Accommodations Division
3-65 Garry Street
Winnipeg, Manitoba
R3C 4K4

.2 Architect (Prime Consultant):

Diamond Schmitt Architects
384 Adelaide Street West, Suite 100
Toronto, Ontario
M5V 1R7

Tel: 416-862-8800

.3 Architect (the Contract Administrator):

Brook McIlroy Architects
91 Albert Street, Unit 1
Winnipeg, Manitoba
R3B 1G5

Tel: 204-515-0780

.4 Structural Engineer:

Entuitive Corporation
120 Bremner Blvd, 4th Floor
Toronto, Ontario
M5J 0A8

Tel: 416-477-5832

.5 Mechanical Engineer:

Smith + Andersen (Winnipeg)
161 Portage Avenue E, Unit 700
Winnipeg, Manitoba
R3B 0Y4

Tel: (204) 885-6668

.6 Electrical Engineer:

Smith and Andersen Consulting Engineering
1100 - 100 Sheppard Avenue East
Toronto, Ontario
M2N 6N5

Tel: 416-487-8151

.7 Sustainable Design Consultant:

Smith + Andersen (Winnipeg)
161 Portage Avenue E, Unit 700
Winnipeg, Manitoba
R3B 0Y4

Tel: (204) 885-6668

.8 Landscape Architect:

Brook McIlroy
91 Albert Street, Unit 1
Winnipeg, Manitoba
R3B 1G5

Tel: (204) 515-0780

.9 Civil Engineer:

J R Cousin Consultants Ltd
91 Scurfield Boulevard
Winnipeg, Manitoba
R3Y 1G4

Tel: (204) 489-0474

END OF SECTION

Table of Contents

DR - indicates entity responsible for preparation of listed documents (see Section 00 01 05)

Document Identification		DR	Pgs	Issued
INTRODUCTORY INFORMATION				
00 01 05	Document Responsibility and Project Directory	A	2	December 11, 2025
00 01 10	Table of Contents	A	11	December 11, 2025
00 31 00	Information Available for Review	CW	1	December 11, 2025
DIVISION 01 - GENERAL REQUIREMENTS				
01 11 00	Summary of Work	A	6	December 11, 2025
	BIM Disclaimer	A	3	December 11, 2025
01 21 00	Allowances	A	3	December 11, 2025
01 25 00	Substitution Procedures	A	3	December 11, 2025
01 29 00	Payment Procedures	A	2	December 11, 2025
01 31 00	Project Management and Coordination	A	5	December 11, 2025
01 31 00	RFI Form	A	1	December 11, 2025
01 31 19	Project Meetings	A	7	December 11, 2025
01 32 00	Construction Progress Documentation	A	6	December 11, 2025
01 33 00	Submittal Procedures	A	9	December 11, 2025
01 33 29	General LEED Requirements	SD	23	December 11, 2025
01 33 29	Schedule S1 Material Information Data Sheet	SD	2	December 11, 2025
01 45 00	Quality Requirements	A	8	December 11, 2025
01 51 00	Temporary Utilities	A	2	December 11, 2025
01 52 00	Temporary Facilities	A	3	December 11, 2025
01 56 00	Temporary Barriers and Enclosures	A	3	December 11, 2025
01 57 00	Temporary Controls	A	3	December 11, 2025
01 57 13	Temporary Erosion and Sediment Control	SD	8	December 11, 2025
01 57 13	Schedule E1 Erosion and Sediment Control Inspection Log	SD	2	December 11, 2025
01 60 00	Product Requirements	A	5	December 11, 2025
01 71 00	Examination and Preparation	A	3	December 11, 2025
01 73 00	Execution	A	7	December 11, 2025
01 73 29	Cutting and Patching	A	3	December 11, 2025
01 74 00	Cleaning	A	3	December 11, 2025
01 74 19	Construction and Demolition Waste Management	SD	4	December 11, 2025
01 77 00	Closeout Procedures	A	3	December 11, 2025
01 78 00	Closeout Submittals	A	6	December 11, 2025
01 78 36	Warranties	A	1	December 11, 2025
01 79 00	Demonstration and Training	A	2	December 11, 2025
01 81 19	Indoor Air Quality Requirements	SD	10	December 11, 2025
01 81 19	Schedule I1 Indoor Air Quality Inspection Log	SD	2	December 11, 2025
01 91 13	General Commissioning Requirements	CX	17	December 11, 2025

Table of Contents

DR - indicates entity responsible for preparation of listed documents (see Section 00 01 05)

Document Identification		DR	Pgs	Issued
01 91 26	Integrated Fire Protection and Life Safety Systems Testing	A	3	December 11, 2025
DIVISION 03 - CONCRETE				
03 10 00	Concrete Forming	S	8	December 11, 2025
03 20 00	Concrete Reinforcement	S	6	December 11, 2025
03 30 00	Cast-in-Place Concrete	S	13	December 11, 2025
03 35 00	Concrete Floor Finishing	A	4	December 11, 2025
03 45 00	Architectural Precast Concrete Base	A	10	December 11, 2025
03 48 19	Precast Concrete Stairs	A	4	December 11, 2025
03 53 00	Cementitious Underlayment	A	4	December 11, 2025
DIVISION 04 - MASONRY				
04 05 00	Masonry Procedures	A	10	December 11, 2025
04 05 13	Mortar and Grout for Masonry	A	4	December 11, 2025
04 05 19	Masonry Reinforcement and Connectors	A	3	December 11, 2025
04 05 23	Masonry Accessories	A	5	December 11, 2025
04 22 00	Concrete Masonry Units	A	2	December 11, 2025
04 22 23	Architectural Concrete Masonry Units	A	3	December 11, 2025
DIVISION 05 - METALS				
05 12 00	Structural Steel	S	25	December 11, 2025
05 31 10	Steel Deck	S	9	December 11, 2025
05 41 13	Lateral Load-Bearing Cold-Formed Metal Framing	A	5	December 11, 2025
05 50 00	Metal Fabrications	A	7	December 11, 2025
05 50 10	Architectural Metal Fabrications	A	10	December 11, 2025
DIVISION 06 - WOOD, PLASTIC, AND COMPOSITES				
06 10 00	Rough Carpentry	S	16	December 11, 2025
06 16 00	Sheathing	S	9	December 11, 2025
06 17 29	Structural Composite Lumber	S	8	December 11, 2025
06 17 33	Wood I-Joists	S	7	December 11, 2025
06 40 00	Architectural Woodwork	A	12	December 11, 2025
06 80 00	Plastic Lumber Fabrications	A	4	December 11, 2025
DIVISION 07 - THERMAL AND MOISTURE PROTECTION				
07 08 00	Commissioning of Thermal and Moisture Protection Systems	CX	11	December 11, 2025
07 13 54	Modified Bituminous Sheet Waterproofing	A	5	December 11, 2025
07 16 16	Surface Applied Crystalline Waterproofing	A	4	December 11, 2025
07 17 18	Bentonite Waterstop	A	4	December 11, 2025

Table of Contents

DR - indicates entity responsible for preparation of listed documents (see Section 00 01 05)

Document Identification		DR	Pgs	Issued
07 18 13	Service Room Traffic Coatings	A	4	December 11, 2025
07 21 00	Thermal Insulation	A	4	December 11, 2025
07 21 10	Below Grade and Perimeter Insulation	A	3	December 11, 2025
07 21 29	Sprayed-Applied Foamed-in-Place Air Barrier Insulation	A	7	December 11, 2025
07 26 16	Below-Grade Vapour Barrier	A	5	December 11, 2025
07 27 00	Air Barrier Systems	A	6	December 11, 2025
07 46 16	Aluminum Composite Panel Cladding System	A	9	December 11, 2025
07 46 19	Metal Cladding Systems	A	9	December 11, 2025
07 52 16	Modified Bituminous Membrane Roofing	A	15	December 11, 2025
07 62 00	Metal Flashing	A	7	December 11, 2025
07 72 33	Roof Hatches	A	3	December 11, 2025
07 81 00	Sprayed Fire-Resistive Materials (SFRM)	A	3	December 11, 2025
07 81 23	Intumescent Fire-Resistive Materials (IFRM)	A	5	December 11, 2025
07 84 00	Joint Firestopping and Smoke Seals	A	7	December 11, 2025
07 92 00	Joint Sealants	A	12	December 11, 2025
07 95 13	Expansion Joint Cover Assemblies	A	4	December 11, 2025
DIVISION 08 - OPENINGS				
08 08 00	Commissioning of Openings	CX	8	December 11, 2025
08 11 13	Steel Doors and Frames	A	13	December 11, 2025
08 12 16	Interior Aluminum Screens and Doors	A	5	December 11, 2025
08 14 00	Flush Wood Doors	A	8	December 11, 2025
08 31 13	Architectural Access Doors	A	3	December 11, 2025
08 31 14	Floor Access Door	A	3	December 11, 2025
08 33 12	Coiling Metal Counter Doors	A	5	December 11, 2025
08 33 13	Rolling Fire Shutters	A	5	December 11, 2025
08 42 29	Automatic Sliding Entrance Doors	A	10	December 11, 2025
08 44 00	Aluminum Framed Glazing Systems	A	24	December 11, 2025
08 54 13	Fibreglass Windows	A	8	December 11, 2025
08 71 00	Finish Hardware	H	45	December 11, 2025
08 80 00	Glass and Glazing	A	16	December 11, 2025
	Glazing & Screen Schedule	A	3	December 11, 2025
08 87 00	Applied Films	A	3	December 11, 2025
08 91 19	Louvres	A	5	December 11, 2025
DIVISION 09 - FINISHES				
09 22 00	Metal Supports for Gypsum Board	A	10	December 11, 2025
09 29 00	Gypsum Board	A	15	December 11, 2025
09 29 90	Gypsum Sheathing Board	A	3	December 11, 2025
09 31 00	Tiling	A	18	December 11, 2025

Table of Contents

DR - indicates entity responsible for preparation of listed documents (see Section 00 01 05)

Document Identification		DR	Pgs	Issued
09 51 13	Acoustical Panel Ceiling Systems	A	5	December 11, 2025
09 51 23	Acoustical Tile Ceiling Systems	A	8	December 11, 2025
09 54 23	Linear Metal Ceilings	A	6	December 11, 2025
09 54 26	Linear Wood Ceilings	A	5	December 11, 2025
09 62 90	Tactile Attention Indicators	A	4	December 11, 2025
09 64 66	Wood Athletic Flooring System	A	9	December 11, 2025
09 65 13	Resilient Base and Accessories	A	7	December 11, 2025
09 65 15	Rubber Sheet Flooring	A	10	December 11, 2025
09 65 17	Vinyl Sheet Flooring	A	10	December 11, 2025
09 65 66	Resilient Athletic Flooring	A	7	December 11, 2025
09 67 00	Fluid-Applied Floor Coatings	A	7	December 11, 2025
09 68 00	Carpet	A	8	December 11, 2025
09 77 13	Acoustic Wall Panels	A	6	December 11, 2025
09 78 13	Metal Wall Panels	A	5	December 11, 2025
09 91 00	Painting	A	11	December 11, 2025
DIVISION 10 - SPECIALTIES				
10 11 00	Visual Display Surfaces	A	3	December 11, 2025
10 21 13	Solid Phenolic Partitions	A	5	December 11, 2025
10 22 26	Operable Partition System	A	6	December 11, 2025
10 26 13	Corner Guard and Wall Protection	A	4	December 11, 2025
10 28 00	Washroom and Janitor Accessories	A	4	December 11, 2025
10 51 13	Prefinished Metal Lockers	A	3	December 11, 2025
10 51 26	Solid Phenolic Lockers	A	3	December 11, 2025
10 56 14	Metal Storage Shelving	A	3	December 11, 2025
10 86 00	Safety/Security Mirrors	A	2	December 11, 2025
DIVISION 11 - EQUIPMENT				
11 14 13	Pedestrian Control Systems	A	8	December 11, 2025
11 24 00	Fall Arrest Anchors and Horizontal Lifelines	A	6	December 11, 2025
11 66 23	Athletic and Gym Equipment	A	5	December 11, 2025
11 66 43	Indoor Scoreboards	A	4	December 11, 2025
11 66 53	Gymnasium Curtain	A	4	December 11, 2025
11 70 00	Patient Lift and Track	A	4	December 11, 2025
DIVISION 12 - FURNISHINGS				
12 24 13	Roller Window Shades	A	7	December 11, 2025
12 48 16	Entrance Floor Grilles	A	3	December 11, 2025
12 67 23	Bleachers and Chairs	A	4	December 11, 2025
12 93 13	Bicycle Racks	A	3	December 11, 2025

DR - indicates entity responsible for preparation of listed documents (see Section 00 01 05)

Document Identification		DR	Pgs	Issued
DIVISION 14 - CONVEYING EQUIPMENT				
14 21 24	Electric MRL Traction Elevators	A	16	December 11, 2025
DIVISION 31 - EARTHWORK				
31 05 19.13	Geotextiles	C	1	December 11, 2025
31 11 00	Clearing & Grubbing	L	3	December 11, 2025
31 22 13	Rough Grading	C	3	December 11, 2025
31 23 00	Excavation and Backfill	A	4	December 11, 2025
31 23 10	Excavating and Backfilling for Trenching	C	3	December 11, 2025
31 24 13	Roadway Embankment and Subgrade	C	1	December 11, 2025
31 61 00	Pile Foundations	S	7	December 11, 2025
DIVISION 32 - EXTERIOR IMPROVEMENTS				
32 11 23	Aggregate Base Courses	C	3	December 11, 2025
32 11 23	Aggregate Base Course	L	5	December 11, 2025
32 12 16	Asphalt Paving	C	3	December 11, 2025
32 14 13	Precast Concrete Unit Paving	L	5	December 11, 2025
32 16 00	Curbs, Gutters and Sidewalks	C	4	December 11, 2025
32 17 23	Pavement Markings	L	2	December 11, 2025
32 17 26	Tactile Warning Surfacing	L	3	December 11, 2025
32 31 13	Fences and Gates	L	4	December 11, 2025
32 33 00	Site Furnishings	L	6	December 11, 2025
32 91 21	Topsoil Placement and Grading	L	6	December 11, 2025
32 92 23	Sodding	L	9	December 11, 2025
32 93 00	Planting of Trees, Shrubs and Ground Covers	L	10	December 11, 2025
32 94 51	Soil Cells	L	16	December 11, 2025
32 94 56	Planting Soil for Soil Cells	L	5	December 11, 2025
DIVISION 33 - UTILITIES				
33 05 13	Manholes and Structures	C	2	December 11, 2025
33 11 00	Pressure Pipeline	C	3	December 11, 2025
33 31 13	Public Sanitary Utility Sewerage Piping	C	4	December 11, 2025
33 41 13	Foundation Drainage	A	3	December 11, 2025

VOLUME 2

INTRODUCTORY INFORMATION

00 01 05	Document Responsibility and Project Directory	A	2	December 11, 2025
00 01 10	Table of Contents	A	11	December 11, 2025

Table of Contents

DR - indicates entity responsible for preparation of listed documents (see Section 00 01 05)

Document Identification		DR	Pgs	Issued
DIVISION 20 - MECHANICAL				
20 05 00	General Instructions for Mechanical Sections	M	25	December 11, 2025
20 05 01	Abbreviations	M	6	December 11, 2025
20 05 02	As-built drawings	M	4	December 11, 2025
20 05 03	Shop Drawings	M	3	December 11, 2025
20 05 13	Electric Motors	M	3	December 11, 2025
20 05 14	Wiring and Starters	M	1	December 11, 2025
20 05 15	Variable Frequency Drives	M	7	December 11, 2025
20 05 19	Indicating Instruments	M	4	December 11, 2025
20 05 29	Hangers and Supports	M	5	December 11, 2025
20 05 33	Electric Tracing	M	4	December 11, 2025
20 05 48	Vibration and Noise Control	M	13	December 11, 2025
20 05 53	Pipe and Ductwork Identification	M	2	December 11, 2025
20 05 54	Nameplates	M	1	December 11, 2025
20 05 55	Valve Tags and Charts	M	2	December 11, 2025
20 05 63	Access Doors and Accessibility	M	2	December 11, 2025
20 05 73	Excavation and Backfill for Mechanical Work	M	3	December 11, 2025
20 05 83	Sleeves and Escutcheons	M	2	December 11, 2025
20 05 88	Cutting and Patching	M	2	December 11, 2025
20 07 00	Insulation	M	25	December 11, 2025
20 08 00	Mechanical System Commissioning	M	7	December 11, 2025
20 08 02	Cleaning and Protection	M	1	December 11, 2025
20 08 03	Operating and Maintenance Instructions	M	4	December 11, 2025
DIVISION 21 - FIRE SUPPRESSION				
21 11 19	Fire Department Connections	M	1	December 11, 2025
21 13 00	Sprinkler Systems	M	12	December 11, 2025
21 25 00	Portable Fire Extinguishers	M	2	December 11, 2025
DIVISION 22 - PLUMBING				
22 05 19	Water Meter	M	1	December 11, 2025
22 05 76	Cleanouts	M	1	December 11, 2025
22 05 79	Service Connections	M	1	December 11, 2025
22 11 13	Pipes, Valves and Fittings (Plumbing System)	M	14	December 11, 2025
22 11 23.29	Circulators	M	1	December 11, 2025
22 13 19.13	Floor Drains	M	3	December 11, 2025
22 13 19.26	Interceptors	M	2	December 11, 2025
22 13 29.13	Sump Pumps and Sump Pits	M	3	December 11, 2025
22 14 26.13	Roof Drains	M	1	December 11, 2025
22 33 00	Domestic Electric Hot Water Heaters	M	2	December 11, 2025
22 42 00	Fixtures and Trim	M	3	December 11, 2025

DR - indicates entity responsible for preparation of listed documents (see Section 00 01 05)

Document Identification		DR	Pgs	Issued
22 42 46	Fixture Carriers	M	62	December 11, 2025
22 42 49	Hydrants (Plumbing Systems)	M	2	December 11, 2025
22 47 13	Refrigerated Drinking Fountains and Bottle Fillers	M	1	December 11, 2025
DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)				
23 05 93.13	Testing and Balancing Piping Systems	M	5	December 11, 2025
23 05 93.23	Testing and Balancing Air Systems	M	5	December 11, 2025
23 09 00	Building Automation System (BAS)	M	46	December 11, 2025
23 09 23	Sequence of Operation for BAS	M	16	December 11, 2025
23 11 23	Natural Gas Piping Systems	M	3	December 11, 2025
23 21 13.23	Piping, Valves & Fittings (Except Plumbing)	M	11	December 11, 2025
23 21 23	Centrifugal Pumps	M	3	December 11, 2025
23 22 53	Pressure Relief Valves	M	1	December 11, 2025
23 23 01	Refrigerant Piping	M	7	December 11, 2025
23 25 13	Heating System Chemical Treatment	M	2	December 11, 2025
23 25 14	Pipe System Filters	M	1	December 11, 2025
23 25 16	Chilled Water Treatments	M	2	December 11, 2025
23 25 26	Cleaning and Filling	M	3	December 11, 2025
23 26 13	Pipe Expansion Joints, Guides and Anchors	M	3	December 11, 2025
23 26 16	Flexible Pipe Connectors	M	1	December 11, 2025
23 31 13	Ductwork and Specialties	M	14	December 11, 2025
23 32 39	Intake and Exhaust Air Plenums	M	3	December 11, 2025
23 34 13	Axial Flow Fans, Mixed Flow Fans, and Centrifugal Fans	M	6	December 11, 2025
23 34 53	Room Ventilators	M	1	December 11, 2025
23 34 63	Roof Mounted Fans	M	4	December 11, 2025
23 36 16	Variable Volume Boxes	M	2	December 11, 2025
23 37 13	Diffusers, Grilles and Registers	M	4	December 11, 2025
23 41 16	Disposable Filters	M	2	December 11, 2025
23 51 33	Positive Pressure Vent and Chimney Systems	M	4	December 11, 2025
23 52 16	Condensing Boilers	M	4	December 11, 2025
23 57 19.13	Heat Exchangers - Plate Type	M	2	December 11, 2025
23 63 13	Air Cooled Condensing Units	M	4	December 11, 2025
23 72 16	Reverse Flow Energy Recovery Dual Cores	M	2	December 11, 2025
23 73 23	Custom Air Conditioning Units	M	5	December 11, 2025
23 77 13	Expansion Tanks	M	3	December 11, 2025
23 81 26	Unitary Air Conditioning Units	M	2	December 11, 2025
23 81 43	Modular Packaged Air-to-Water Heat Pumps	M	9	December 11, 2025
23 82 16	Coils	M	2	December 11, 2025
23 82 36	Wall Fin Convectors	M	4	December 11, 2025
23 82 39	Unit Heaters	M	1	December 11, 2025

DR - indicates entity responsible for preparation of listed documents (see Section 00 01 05)

Document Identification		DR	Pgs	Issued
23 82 39.13	Cabinet Heaters	M	1	December 11, 2025
23 84 13	Humidifiers	M	2	December 11, 2025
SCHEDULES				
	Child Care Air Plant Composition Schedule	M	1	December 11, 2025
	Child Care ASHRAE 62.1 – 2016 Minimum Ventilation Calculations	M	1	December 11, 2025
	Child Care Condensing Unit Schedule	M	1	December 11, 2025
	Child Care Cooling Coil Schedule	M	1	December 11, 2025
	Child Care Domestic Hot Water Heater Schedule	M	1	December 11, 2025
	Child Care Expansion Tank Schedule	M	1	December 11, 2025
	Child Care Fan Schedule	M	1	December 11, 2025
	Child Care Heating Coil Schedule	M	1	December 11, 2025
	Child Care HRV Schedule	M	1	December 11, 2025
	Child Care Pump Schedule	M	1	December 11, 2025
	Child Care Split System Schedule	M	1	December 11, 2025
	Rec Centre Air Plant Composition Schedule	M	1	December 11, 2025
	Rec Centre Air Source Heat Pump Schedule	M	1	December 11, 2025
	Rec Centre ASHRAE 62.1 – 2016 Minimum Ventilation Calculations	M	1	December 11, 2025
	Rec Centre Boiler Schedule	M	1	December 11, 2025
	Rec Centre Cooling Coil Schedule	M	1	December 11, 2025
	Rec Centre Domestic Hot Water Heater Schedule	M	1	December 11, 2025
	Rec Centre Expansion Tank Schedule	M	1	December 11, 2025
	Rec Centre Fan Schedule	M	2	December 11, 2025
	Rec Centre Force Flow Heater, Fan Coil, Unit Heater Schedule	M	2	December 11, 2025
	Rec Centre Heating Coil Schedule	M	1	December 11, 2025
	Rec Centre HRV Schedule	M	1	December 11, 2025
	Rec Centre Humidifier Schedule	M	1	December 11, 2025
	Rec Centre Pump Schedule	M	2	December 11, 2025
	Rec Centre Reheat Coil Schedule	M	3	December 11, 2025
	Rec Centre Silencer Schedule	M	1	December 11, 2025
	Rec Centre Split System Schedule	M	1	December 11, 2025
	Rec Centre & Child Care VAV Schedule	M	1	December 11, 2025
DIVISION 26 - ELECTRICAL				
26 01 00	Operating and Maintenance Instructions	E	3	December 11, 2025
26 05 01	General Instructions for Electrical Sections	E	26	December 11, 2025
26 05 03	As-Built Drawings	E	3	December 11, 2025
26 05 04	Submittals/Shop Drawings	E	2	December 11, 2025

Table of Contents

DR - indicates entity responsible for preparation of listed documents (see Section 00 01 05)

Document Identification		DR	Pgs	Issued
26 05 05	Mounting Heights	E	2	December 11, 2025
26 05 21	Wires and Cables Under 2000 V	E	10	December 11, 2025
26 05 26	Grounding + Bonding	E	5	December 11, 2025
26 05 29	Hangers and Supports	E	2	December 11, 2025
26 05 31	Splitters, Junction, Pull Boxes and Cabinets	E	2	December 11, 2025
26 05 32	Outlet Boxes, Conduit Boxes and Fittings	E	3	December 11, 2025
26 05 34	Conduits, Conduit Fasteners and Fittings	E	5	December 11, 2025
26 05 36	Cable Trays	E	4	December 11, 2025
26 05 40	Poke-thru Devices	E	2	December 11, 2025
26 05 44	Installation of Cables in Trenches and in Ducts	E	2	December 11, 2025
26 05 53	Identification	E	5	December 11, 2025
26 05 63	Access Doors and Accessibility	E	2	December 11, 2025
26 05 73	Electrical Power System Studies	E	5	December 11, 2025
26 05 83	Sleeves	E	2	December 11, 2025
26 05 88	Cutting and Patching	E	2	December 11, 2025
26 08 00	Commissioning	E	5	December 11, 2025
26 09 13.01	Power Monitoring System – Web Based	E	5	December 11, 2025
26 09 24	Lighting Control Equipment – Addressable Low Voltage	E	15	December 11, 2025
26 12 17	Dry Type Transformers – 600V Primary	E	4	December 11, 2025
26 12 18	Harmonic Mitigating Dry Type Transformers	E	4	December 11, 2025
26 24 13	Switchboards	E	5	December 11, 2025
26 24 17	Panelboards – Breaker Type	E	3	December 11, 2025
26 27 02	Surge Protective Device	E	6	December 11, 2025
26 27 19	Multi-Outlet Assemblies	E	3	December 11, 2025
26 27 26	Wiring Devices	E	5	December 11, 2025
26 27 43	Electrical Vehicle (EV) Charging Stations	E	5	December 11, 2025
26 28 14	Fuses Low Voltage	E	2	December 11, 2025
26 28 21	Moulded Case and Insulated Case Circuit Breakers	E	5	December 11, 2025
26 28 23	Disconnect Switches – Fused and Non-Fused	E	2	December 11, 2025
26 29 00	Motor Starters to 600 V	E	7	December 11, 2025
26 33 53	Uninterruptible Power Systems - Static	E	10	December 11, 2025
26 51 13	Lighting Equipment	E	9	December 11, 2025
26 51 14	Sports and Recreational Lighting	E	3	December 11, 2025
26 52 01	Unit Equipment for Emergency Lighting	E	3	December 11, 2025
26 52 01.01	Emergency Lighting - Inverter	E	14	December 11, 2025
26 52 01.02	Single Phase Inverters for Emergency Lighting	E	4	December 11, 2025
26 60 01	Elevator Services	E	3	December 11, 2025
26 60 20	Hand Dryers	E	1	December 11, 2025
28 05 00	Raceways for Security System	E	1	December 11, 2025

DR - indicates entity responsible for preparation of listed documents (see Section 00 01 05)

Document Identification		DR	Pgs	Issued
28 31 02	Multiplex Fire Alarm System	E	17	December 11, 2025
28 31 03	Multiplex Fire Alarm and Voice Communication System	E	20	December 11, 2025
33 05 23	Excavation and Backfill for Electrical Work	E	2	December 11, 2025
33 71 19	Concrete Encased Duct Banks and Maintenance Chambers	E	5	December 11, 2025
	Attachment A Recreation Centre Lighting Control Sequence Of Operations	E	1	December 11, 2025
	Attachment B Childcare Lighting Control Sequence of Operations	E	1	December 11, 2025
DIVISION 27 - COMMUNICATIONS				
27 00 05.10	General Instructions for Telecommunications Sections	E	14	December 11, 2025
27 00 05.20	Definitions and Abbreviations	E	10	December 11, 2025
27 00 05.30	Codes, Standards and Regulations	E	5	December 11, 2025
27 00 05.50	Contract Documents	E	1	December 11, 2025
27 00 05.60	Administrative Requirements	E	6	December 11, 2025
27 00 05.70	Project Specific Requirements	E	3	December 11, 2025
27 00 06	Fire Stopping and Water Proofing	E	4	December 11, 2025
27 05 26	Grounding and Bonding for Telecommunications Systems	E	2	December 11, 2025
27 05 28	Pathways for Telecommunications Systems	E	5	December 11, 2025
27 05 48	Seismic Protection	E	4	December 11, 2025
27 05 53	Identification for Telecommunications Systems	E	4	December 11, 2025
27 08 00	Commissioning for Telecommunications Sections	E	7	December 11, 2025
27 11 13	Telecommunications Entrance Protection	E	2	December 11, 2025
27 11 16	Telecommunications Cabinets, Racks, Frames and Enclosures	E	5	December 11, 2025
27 11 19	Telecommunications Termination Blocks and Patch Panels	E	3	December 11, 2025
27 11 23	Telecommunications Cable Management and Ladder Rack	E	1	December 11, 2025
27 13 13	Telecommunications Copper Backbone Cabling	E	5	December 11, 2025
27 13 23	Telecommunications Optical Fibre Backbone Cabling	E	5	December 11, 2025
27 15 00.19	Data Telecommunications Horizontal Cabling	E	5	December 11, 2025
27 15 01.16	Voice Telecommunications Horizontal Cabling	E	3	December 11, 2025
27 15 33	Telecommunications Coaxial Horizontal Cabling	E	2	December 11, 2025
27 15 43	Telecommunications Faceplates and Connectors	E	6	December 11, 2025
27 16 19	Telecommunications Patch Cords and Cross Connect Wire	E	3	December 11, 2025

DR - indicates entity responsible for preparation of listed documents (see Section 00 01 05)

Document Identification		DR	Pgs	Issued
DIVISION 28 - ELECTRONIC SAFETY AND SECURITY				
28 01 00	General Instructions for ESS Sections	E	2	December 11, 2025
28 05 05.20	Definitions and Abbreviations	E	9	December 11, 2025
28 00 05.30	Codes, Standards, and Regulations	E	15	December 11, 2025
28 00 05.60	Administrative Requirements	E	18	December 11, 2025
28 00 06	Fire Stopping and Water Proofing	E	21	December 11, 2025
28 01 01	Operation and Maintenance of Electronic Safety and Security	E	25	December 11, 2025
28 05 03	Record Drawings	E	28	December 11, 2025
28 05 04	Submittals – Shop Drawings	E	31	December 11, 2025
28 05 13	Conductors and Cables for Electronic Safety and Security	E	32	December 11, 2025
28 05 26	Grounding and Bonding for Electronic Safety and Security	E	34	December 11, 2025
28 05 28	Pathways for Electronic Safety and Security	E	38	December 11, 2025
28 05 53	Identification for Electronic Safety and Security	E	40	December 11, 2025
28 08 00	Commissioning of Electronic Safety and Security	E	42	December 11, 2025
28 13 00	Access Control	E	45	December 11, 2025
28 16 00	Intrusion Detection	E	72	December 11, 2025
28 23 00	Video Surveillance	E	83	December 11, 2025
28 26 00	Electronic Personal Protection System	E	94	December 11, 2025
28 40 00	Electronic Safety and Security Systems Integration	E	101	December 11, 2025
28 51 00	Intercom System	E	109	December 11, 2025

END OF SECTION

1.1 Information Available for Review

.1 The following documents are made available for review:

.1 Geotechnical report(s):

.1 Appendix A: “South Winnipeg Recreation Campus – Phase 2 Geotechnical Engineering Report”, dated March 19, 2024, prepared by KGS Group.

.2 Appendix B: “South Winnipeg Recreation Campus – Geotechnical Services, Long-Term Groundwater Monitoring”, dated January 22, 2025, prepared by KGS Group.

.2 Environmental Site Assessment report(s):

.1 Appendix C: "Phase 1 Environmental Site Assessment - South Winnipeg Recreation Campus" dated January 9, 2023, prepared by Pinchin.

.3 Traffic report(s):

.1 Appendix D: "South Winnipeg Recreation Campus - Traffic and Parking Study" dated March 2025, prepared by MORR Transportation Consulting Ltd.

.4 Audio visual report:

.1 Appendix E: “Audio Visual Report for South Winnipeg Recreation Campus” dated September 26, 2025, prepared by Smith + Andersen.

.5 Schematic delineation drawing:

.1 Appendix F: “Schematic Delineation Drawing”, dated December 11, 2025, prepared by Diamond Schmitt Architects Inc.

.2 The accuracy of the information contained in the above listed documents has not been independently verified by the Contract Administrator.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Contract Documents conventions.

.2 Contract Documents for construction purposes.

.3 Law, notices, permits and fees.

.4 Documents at the Site.

.5 Use of premises and the Site.

.6 Items supplied by City.

.7 Electronic files.

1.2 Contract Documents Conventions

.1 The Contract Documents have been arranged into various divisions, sections, drawings, and schedules for the purpose of presenting the Work in a logical and organized form and to enable ease of reference and interpretation, and are not intended to be an arrangement of precise and independent Subcontractors, or jurisdiction of responsibility for the various parts of the Work.

.1 The Contractor shall be solely responsible for coordinating the execution of the Work of this Contract in accordance with the requirements of the Contract Documents.

.2 The Contract Administrator and City shall not be required to decide on questions arising with regard to agreements or contracts between the Contractor and Subcontractors or suppliers, nor to the extent of the parts of the Work assigned thereto, nor to establish subcontract limits between Sections or Divisions of the Work.

.3 No extra will be allowed as a result of the failure to coordinate and allocate the Work such that the Work is provided in accordance with the Contract Documents.

.2 The Specifications are written in the imperative mood and in streamlined form. The imperative language is directed to Contractor, unless stated otherwise.

.3 Complete sentences by reading "shall", "Contractor shall", "shall be", and similar phrases by inference. Where a colon (:) is used within sentences and phrases, read the words "shall be" by inference.

.4 Fulfill and perform indicated requirements whether stated imperatively or otherwise.

.5 Named Materials alternates or equals, indicated by the phrases "or approved alternate by XYZ Manufacturing" or "or approved equal by XYZ Manufacturing", shall be interpreted to mean that named Material alternate or equal, if selected for use in lieu of indicated or specified Material, meets or exceeds performance, appearance, general arrangement, dimensions, availability, code and standards compliance, and colour of specified Material. Be responsible for costs and modifications associated with the inclusion of named Material alternate or equal at no additional cost to the City.

.6 The use within the Contract Documents of the words “include” or “including” or variations thereof is not limiting.

.7 The use within the Contract Documents of the words “specified”, “scheduled”, or “indicated”, or any combination thereof, shall mean “specified by the Contract Documents”, “scheduled by the Contract Documents”, and “indicated by the Contract Documents”, respectively, unless the context clearly and explicitly means otherwise.

.8 The use within the Contract Documents of the words “make good” or “making good” shall mean that, when a finish or material has been altered, the material or finish shall be repaired or replaced, and refinished to match existing quality and appearance to acceptance of Contract Administrator, and that repaired or replaced and refinished Work shall not be discernible from existing materials or finishes when judged by the Contract Administrator from a viewing distance of 1830 mm (6'), and that such work is included in the Contract Price.

.9 The Contract Documents have been prepared in the English language. Communications, submittals and written correspondence shall be in the English language for the Work of this Contract.

.10 Where a component, device, item, or part of materials or equipment is referred to in the singular number, such reference shall require the provision of as many components, devices, items, or parts of material or equipment necessary to complete the Work.

.11 Reference standards:

.1 “Reference standards” means consensus standards, trade association standards, guides, and other publications expressly referenced in Contract Documents.

.2 Where an edition or version date is not specified, referenced standards shall be deemed to be the latest edition or revision issued by the publisher at the time of bid closing, except as follows:

.1 If a particular edition or revision date of a specified standard is referenced in an applicable code or other regulatory requirement, the edition or version referenced in the applicable code or other regulatory requirement shall apply.

.3 The Contract Documents may specify, indicate, or schedule requirements that exceed the requirements of the building code, other applicable codes, requirements of authorities having jurisdiction, and standards cited in the Contract Documents. In such cases, the requirements specified, indicated, or scheduled in the Contract Documents shall govern.

.4 If compliance with two or more reference standards is specified and the standards establish different or conflicting requirements, comply with the most stringent requirement. Refer uncertainties to Contract Administrator for clarification.

1.3 Contract Documents for Construction Purposes

.1 Contract Administrator shall supply Contractor with a complete set of Contract Documents in electronic form before commencement of the Work.

1.4 Laws, Notices, Permits, and Fees

.1 The building code – Manitoba Building Code Reg. 78/2023, including amendments, and the City of Winnipeg Accessible Design Standard, Third Edition, revised September 2018 shall govern the Work.

.2 Comply with codes, by-laws, and regulations of authorities having jurisdiction over the Site. Codes and regulations form an integral part of the Contract Documents.

.3 City shall apply and pay for the building permit. The Contractor shall reimburse the City for the building permit in a Change Work Order. The Contractor shall pick up the building permit from the municipal department having jurisdiction at the Site. Obtain and pay for all other permits, licenses, deposits and certificates of inspection as part of the Work.

.4 Arrange for inspection, testing and acceptance of the Work required by the authorities having jurisdiction. Be responsible for necessary preparations, provisions and pay costs.

.5 Obtain permits required to execute work on municipal rights of way. Obtain damage deposits for sidewalks, roads and services, unless otherwise indicated.

.6 It is the responsibility of the Contractor to schedule notifications and inspections required by authorities having jurisdiction such that notifications can be properly received and that inspections can be properly undertaken without causing a delay in the Work. The Contractor, at no additional cost to the City, shall be solely responsible for any delay in the Work caused by failure to properly schedule required notifications and inspections.

1.5 Documents at the Site

.1 Maintain at the Site, one copy of each of following:

.1 Contract Documents including drawings, specifications, addenda, and other modifications to the Contract.

.1 The Issued for Construction (IFC) version of the Contract Documents shall be the version retained at the Site. The IFC version shall be prepared by the Contract Administrator and provided to the Contractor at no cost. In cases of dispute, the original signed version of the Contract Documents, including addenda issued, shall govern over the IFC version.

.2 ‘Reviewed' or 'Reviewed as Noted’ submittals.

.3 Construction and submittal schedules.

.4 Field instructions, Proposed Change Notices (PCN), and Change Work Orders (CWO).

.5 RFI responses and RFI log.

.6 Field test reports and independent testing reports.

.7 Contract Administrator’s field review reports and deficiency reports.

.8 Manufacturer’s field review reports.

.9 Reports by authorities having jurisdiction.

.10 Building and other applicable permits, and related permit documents.

.11 Current edition of LEED manual referenced in Section 01 33 29.

.12 Daily log including:

.1 Weather (precipitation, high and low temperatures, wind, and visibility).

.2 Pertinent conditions at the Site (muddy, flooded, frozen ground, water level).

.3 Number of workers actively working at the Site by each subcontract.

.4 Subcontractors working at the Site.

.5 Parts of the Work being worked on.

.6 Working hours worked at the Site.

.7 Activities with intermittent progress.

.8 Time lost and explanation for such time lost.

.9 Difficulties (work scheduled to start but did not with the reason why, delays, labour inefficiencies, labour shortage, weather).

.10 Materials and materials delivered.

.11 Equipment mobilized and/or demobilized.

.12 Excavation conditions.

.13 Start and finish date of each part of the Work.

.14 Erection and removal dates of formwork.

.15 Date, quantities and particulars of each concrete pour.

.13 As-built drawings recording as-built conditions, instructions, changes for structure, equipment, wiring, plumbing, and the like, as called for in Section 01 78 00 and Divisions 21, 22, and 23 and Divisions 26, 27, and 28, prior to being concealed.

.2 Make above material available to Contract Administrator upon request.

1.6 Use of Premises and the Site

.1 Make good roads, soft landscaping, walkways, curbs, sidewalks, possessions and property, soiled or damaged due to the Work, to requirements of authorities having jurisdiction and requirements of City, as applicable.

.2 Fully protect adjacent site improvements, services, landscaping, and other works using suitable covering and support framing, to prevent damage by construction related activities.

1.7 Not In Contract Items

.1 NIC (Not In Contract) shall be used to designate various items of equipment that require coordination for installation although are not provided as part of the Work.

.1 City Responsibilities:

.1 Order and pay for items supplied by City not already in City’s possession.

.2 Arrange and pay for delivery of items supplied by City F.O.B. the Site, within time frames required by Contractor’s progress schedule. If delivered sooner than required by Contractor’s latest progress schedule submitted to City, arrange and pay for delivery to a temporary storage location and subsequent delivery to the Site.

.3 Advise Contractor in writing of the value of items supplied by City for Contractor’s insurance purposes.

.4 Arrange for electronic delivery to Contractor of reviewed Shop Drawings, Material data, and manufacturer's installation instructions.

.5 Inspect deliveries jointly with Contractor.

.6 Submit claims for transportation damage.

.7 Arrange for replacement of damaged, defective or missing items identified at time of delivery.

.8 Arrange for manufacturer's field services.

.9 Arrange for delivery of manufacturer's warranties to Contractor for inclusion in operation and maintenance manual.

.2 Contractor Responsibilities:

.1 Designate in progress schedule, time frames for delivery of items supplied by City to the Site and for receipt of related submittals. If the Site is not ready to receive delivery of items supplied by City within the time frame indicated in the latest progress schedule submitted to City, arrange and pay for delivery to a temporary storage location and subsequent delivery to the Site.

.2 Review all required submittals and notify Contract Administrator of any observed discrepancies or anticipated problems.

.3 Ensure that course of construction insurance is adequate to cover items supplied by City.

.4 Arrange and pay for delivery of samples to Toronto and Winnipeg for review.

.5 Receive and unload items supplied by City at the Site.

.6 Inspect deliveries jointly with City. Record and notify City and Contract Administrator of shortages and visibly damaged or defective items.

.7 Handle items supplied by City at the Site, including uncrating and storage. Dispose of waste materials and debris.

.8 Take appropriate precautions to protect items supplied by City from loss or damage.

.9 Repair or replace items damaged at the Site.

.10 Assemble, install, connect, adjust, and finish items supplied by City as specified.

.11 Arrange for inspections required by authorities having jurisdiction as specified.

.12 Arrange for or perform testing as specified.

.13 Workmanship warranty for installation.

1.8 Electronic Files

.1 The Contractor shall be provided with 1 set of Issued for Construction digital files in native file formats from the Contract Administrator free of charge.

.1 Subcontractors and suppliers requiring Issued for Construction digital files in native file formats shall make arrangements with the Contractor. The Contract Administrator will not provide digital files directly to Subcontractors or suppliers.

.2 Prior to delivery of digital files, a BIM data disclaimer shall be signed by the Contractor and any entity requesting digital files.

.1 Form of disclaimer shall be provided by the Contract Administrator. An example disclaimer is appended to this section for reference.

.3 The Contract Administrator or other consultants/subconsultants may charge a fee for providing the electronic files at the Contract Administrator's or other consultant's/subconsultant's discretion.

.1 Payment, where required, shall be made directly to the other consultant/subconsultant, and not through the Contract Administrator.

.4 Management of electronic files shall be done using the Contract Administrator's document management system (Newforma):

.1 The Contract Administrator shall use, for the digital management of all construction documents, the document management system Newforma.

.2 Newforma, as described elsewhere herein, shall be used exclusively by the Contract Administrator in the distribution of RFI responses and return of all submittals, inclusive of, but not limited to: Shop Drawings, Material data, samples, mock-up reviews, close-out documents.

.3 Newforma shall be used to issue Field Instructions, Proposed Change Notices, and Change Work Orders.

.4 Newforma shall be used to distribute correspondence to the Contractor, including but not limited to: meeting minutes, CAD files, BIM files, site visit reports, field review reports, deficiency review reports.

.5 The Contract Administrator shall not use, manage or consult the Contractor's own data management software.

PART 2 - PRODUCTS
Not applicable.

PART 3 - EXECUTION
Not applicable.

END OF SECTION

diamond schmitt

BIM DATA DISCLAIMER

384 Adelaide Street West, Suite 100
Toronto, ON M5V 1R7

t: 416 862 8800

1050 West Pender Street, Suite 2010
Vancouver, BC V6E 3S7

t: 604 674 0866

1776 Broadway, Suite 2200
New York, NY 10019

t: 212 710 4329

www.dsai.ca
info@dsai.ca

Project Name:	xxx	Project No:	xxx
File Format(s):	RVT, IFC, NWC, DWG	No. of Files:	x
File Name(s):	(See table at the end of disclaimer)		

1.0 This Building Information Model (BIM) data is being provided at the request of and for the convenience of the recipient only. It may be incomplete, contain unintentional inaccuracies, or be partially obsolete. The user is further warned that, while all digital BIM data appears to be extremely accurate, this apparent accuracy is an artifact of the techniques used to generate it and is in no way intended to imply actual accuracy.

2.0 The drawings remain the contract documents. In the event of a discrepancy between model elements or between the model elements and the drawings, the model element author shall be notified. The user of this data takes full responsibility for the accuracy and correctness of all measurements, areas, inventories, etc. extracted from this data either manually or with the use of a computer.

3.0 The user is advised that any translation of BIM data from one computer system or environment to another can and often does result in the loss of important data. This loss can include but may not be limited to portions of text and dimensions, the existence, location or scale of symbols or other elements of graphics; the internal structure of data, including layers and data attributes; and the style or weight of lines. Diamond Schmitt Architects Incorporated makes no representations as to the usability of this BIM data on any system.

4.0 Users of the BIM data are advised to review all current versions, as well as subsequent versions, of project documentation for inconsistencies and revisions. It is the responsibility of the user to identify and make all required revisions or corrections to this data. Diamond and Schmitt Architects Incorporated will not routinely issue updates to BIM data.

5.0 By acceptance of this electronic media and the files it contains, the user agrees, to the fullest extent of the law, to indemnify and hold Diamond Schmitt Architects harmless from any damage, cost or liability, including but not limited to reasonable attorney's fees and cost of defense, arising from any changes made to these files by anyone other than Diamond Schmitt Architects Incorporated or from reuse of files and data without the prior written consent of Diamond Schmitt Architects Incorporated.

diamond schmitt

6.0 While reasonable care has been used to ensure that the transfer medium and the material are free of computer viruses, Diamond Schmitt Architects Incorporated accepts no responsibility for any loss or damage that might result from the transmission of computer viruses in this process.

7.0 The copyright of this BIM data belongs to Diamond Schmitt Architects Incorporated and it may not be altered, modified, copied, or transferred to another company or individual, either in part or whole, without express written permission from Diamond Schmitt Architects Incorporated. Diamond Schmitt Architects Incorporated grants the recipient non-exclusive license to use the BIM for construction purpose for this project only. The license includes the right to create a derivative model. Alterations are at the sole risk of the recipient making the alterations, and Diamond Schmitt Architects Incorporated shall have no responsibility for any alterations made.

8.0 Elements included in the BIM data such as, but not limited to, families, components, shared parameters, view templates, family templates and project templates are property of Diamond Schmitt Architects Incorporated and are protected by intellectual property laws including copyright laws. The recipient of the BIM data agrees to be bound by any such intellectual property and copyright laws and other than using it specifically for the above-mentioned project, shall not sell, transfer, modify, use, or otherwise incorporate these elements into its own office standards or it will be in violation of such laws.

9.0 If shop drawings are issued by the Contractor which appears to have made unaltered use of the BIM files issued by Diamond Schmitt Architects Incorporated, they will be returned without review. Under no circumstances can it be assumed that Diamond Schmitt Architects Incorporated working drawings are sufficiently detailed to become documents for final manufacturing (shop drawings).

10 The terms of this disclaimer are effective immediately upon the User's receipt of digital information.

Full Name: _____

Signature: _____

Company: _____

diamond schmitt

Date: _____

List of project files associated with provisions outlined in this BIM Data Disclaimer.

File Name	Date

PART 1 - GENERAL

1.1 Section Includes

.1 Cash allowances.

.2 Allowance for vibration monitoring.

1.2 Cash Allowances

.1 Expenditure of cash allowances:

.1 The City, through the Contract Administrator, will provide the Contractor with documentation required to permit pricing of a cash allowance item.

.2 The City, through the Contract Administrator, may request the Contractor to disclose originals of all bids, quotations, and other price-related information received from potential suppliers or Subcontractors.

.3 The City, through the Contract Administrator, will determine by whom each cash allowance item will be performed and for what amount. Obtain City's prior written approval in the form of a Change in Work before entering into a subcontract, amending an existing subcontract, or before performing by own forces, work that is covered by a cash allowance. Upon issuance of the Change in Work, the Contractor's responsibilities for a cash allowance item shall be the same as for other work of the Contract.

.4 Unexpended amounts of cash allowances shall be deducted from the Contract Price at completion of Work.

.2 Cash allowances are for supply and installation unless otherwise specified.

.3 Amount of each cash allowance does not include Contractor's overhead and profit, and other related costs, which shall be included in the Contract Price and not in the cash allowance.

.4 Cash allowances for supply only:

.1 Amount of each cash allowance includes:

.1 Cost of Materials as invoiced by the supplier, including delivery and applicable taxes but excluding Value Added Taxes.

.2 Amount of each cash allowance does not include costs of the following items, which costs shall be included in the Contract Price and not in the cash allowance:

.1 Unloading, handling and storage at the Site.

.2 Installation and all other related costs.

.5 Cash allowances for install only:

.1 Amount of each cash allowance includes:

.1 Unloading, storing, handling of Materials at the Site.

.2 Installation, finishing, and commissioning of Materials.

.3 Applicable taxes and duties (excluding Value Added Taxes).

.2 Amount of each cash allowance does not include costs of the following items, which costs shall be included in the Contract Price and not in the cash allowance:

.1 Net cost of Materials.

.2 Delivery to the Site.

.6 Cash allowances for supply and install:

.1 Amount of each cash allowance includes:

.1 All costs to provide the specified Materials, including supply, installation, and related costs, excluding Value Added Taxes.

.2 Subcontractor's and sub-Subcontractor's overheads and profits related to the cash allowance.

.7 Cash allowances for services:

.1 Amount of each cash allowance includes:

.1 All costs related to the services, excluding Value Added Taxes.

.2 Subcontractor's and sub-Subcontractor's overheads and profits related to the cash allowance.

.8 List of cash allowances:

.1 The following cash allowances are included in the Contract Price for a total of $1,720,000:

.1 Independent inspection and testing per Section 01 45 00.

.2 Unforeseen silt removal.

.3 Unforeseen piling and foundation revisions.

.4 Vibration monitoring.

.5 LEED IAQ testing.

.6 Interior, exterior, site wayfinding signage.

.7 Physical access control.

1.3 Allowance for Vibration Monitoring

.1 The Contractor shall take all precautions necessary to prevent damage to structures and adjacent properties during or as a consequence of pile installation operations. In the event of damage, the Contractor will be held liable and shall be required to provide appropriate restoration and repairs at their cost.

.2 The Contractor shall implement a vibration monitoring program to record the magnitude of construction-induced ground vibrations during driving of piles in close proximity to the existing structure with the intent of avoiding damage due to excess vibration during pile installation activities.

.3 Submit a Vibration Monitoring Plan for review and approval of the Contract Administrator prior to the start of piling activities, and identify equipment to be utilized, proposed monitor locations, and response values or tolerance limits that would require a change in work methods to address and mitigate induced ground vibration.

.4 The Contractor shall develop their methodology and approach to the work based on vibration tolerances that they deem an acceptable risk.

.5 The Contractor or their designate shall complete a pre-construction photographic survey of the existing structure(s) adjacent to the Work. This documentation will be considered the baseline condition and referenced to determine if any damage is incurred during the construction works. This survey shall be repeated at the completion of construction to assess potential damage.

.6 A minimum of two (2) vibration monitoring units shall be installed to measure construction-induced ground vibrations. Record Peak Particle Velocity (PPV), the calculated vector sum of the vibrations occurring along three axes (transverse, longitudinal, and vertical) simultaneously. Record data and provide to the Contract Administrator.

.7 The cost for instrumentation and monitoring shall be paid for by cash allowance for “Vibration Monitoring”.

PART 2- PRODUCTS
Not applicable.

PART 3 - EXECUTION
Not applicable.

END OF SECTION

PART 1 – GENERAL

1.1 Section Includes

.1 Substitution procedures.

.2 Submission requirements for proposed substitutions.

1.2 Definition

.1 In this Section “Substitution” means a Material, a manufacturer, or both, not originally specified in Contract Documents by proprietary name but proposed for use by Contractor in place of a Material, a manufacturer, or both, specified by proprietary name.

1.3 Substitution Procedures

.1 Proposals for substitutions of Materials and materials must be submitted in accordance with procedures specified in this section.

.2 Contractor may propose a Substitution wherever specifications include the phrases "or equal", "or approved equal", “Substitutions: in accordance with Section 01 25 00”, or words conveying this intent. Where specifications do not include such language, Contractor proposed substitutions shall not be permitted.

.3 Do not order or install any substitution without a Field Instruction or Change in Work.

.4 Contract Administrator services to review substitutions will be performed on an additional services basis to their Contract with the City. Costs of these services will be discounted from any reductions in the Contract Price that might be forthcoming from the substitution. Therefore, to be acceptable, a substitution must present a reduction in the construction cost at least equal to the cost to the City of the Contract Administrator’s additional services to review the substitution. Contractor shall cover directly any administration costs and administration associated with courier services, reproduction costs, and other direct costs associated with these substitution reviews.

.1 Should it appear to the Contract Administrator that the value of services required to evaluate the substitution exceeds the potential reduction, the Contract Administrator will advise the City that the substitution does not merit consideration before proceeding with a full evaluation. If the substitution will produce a reduction commensurate with or exceeding the value of the Contract Administrator’s services to evaluate the substitution, the Contract Administrator will request the City’s direction to proceed with evaluation.

.5 Contract Administrator may recommend to City acceptance of a Substitution proposed by Contractor if satisfied that:

.1 The proposed substitute Material is the same type as, is capable of performing the same functions as, interfaces with adjacent work the same as, and meets or exceeds the standard of quality, performance and, if applicable, appearance and maintenance considerations, of the specified Material.

.2 The proposed substitute manufacturer has capabilities comparable to the specified manufacturer.

.3 The Substitution provides a benefit to City.

.4 The proposed substitution has been reviewed by the LEED Consultant and meets requirements outlined within Section 01 33 29 Part 2 Products.

.6 Failure to order a specified Material or to order a Material by a specified manufacturer in adequate time to meet construction progress schedule shall not be considered a valid reason to propose a Substitution. Refer to Section 01 60 00, paragraph 1.2 “Availability of Products”.

.7 If City accepts a Substitution, the change in the Work will be documented in the form of either a Field Instruction or Change in Work as specified in the General Conditions.

.8 If a Substitution is accepted in the form of a Field Instruction or Change in Work, Contractor shall not revert to an originally specified Material or manufacturer without Contract Administrator’s prior written acceptance.

1.4 Submission Requirements for Proposed Substitutions

.1 Include with each proposed Substitution the following information:

.1 Identification of the Substitution, including Material name and manufacturer’s name, address, telephone numbers, and web site.

.2 Reason(s) for proposing the Substitution.

.3 A statement verifying that the Substitution will not affect the Contract Price and Contract Time or, if applicable, the amount and extent of a proposed increase or decrease in Contract Price and Contract Time on account of the Substitution.

.4 A statement verifying that the Substitution will not affect the performance or warranty of other parts of the Work.

.5 Manufacturer’s Material literature for the Substitution, including material descriptions, compliance with applicable codes and reference standards, performance and test data, compatibility with contiguous materials and systems, and environmental considerations.

.6 Material samples as applicable.

.7 A detailed comparison of the physical properties and performance characteristics of the specified Material and the Substitution, with any significant variations clearly highlighted.

.8 Availability of maintenance services and sources of replacement materials and parts for the Substitution, as applicable, including associated costs and time frames.

.9 If applicable, estimated life cycle cost savings resulting from the Substitution.

.10 Details of other projects and applications where the Substitution has been used.

.11 Identification of any consequential changes in the Work to accommodate the Substitution and any consequential effects on the performance of the Work as a whole. A later claim for an increase to the Contract Price or Contract Time for other changes in the Work attributable to the Substitution will not be considered.

.12 Confirmation of proposed substitution delivery, in writing by Material manufacturer.

.13 Compliance with the building codes and requirements of authorities having jurisdiction.

.14 Copy of manufacturer's warranty for any Material or system for which an extended warranty has been specified, along with copy of manufacturer's warranty for specified Material or system with differences highlighted.

.2 Substitutions submitted on Shop Drawings without following requirements of this section prior to submission of the affected Shop Drawings will cause the Shop Drawings to be rejected.

.3 Proposed substitutions shall include costs associated with modifications necessary to other adjacent and connecting portions of the Work.

PART 2 - PRODUCTS
Not applicable.

PART 3 - EXECUTION
Not applicable.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Schedule of values.

.2 Cash flow projection.

.3 Payment for Materials stored off site.

1.2 General

.1 Refer to the City of Winnipeg General Conditions for Construction section C12 'Measurement and Payment' in accordance with this section.

1.3 Schedule of Values

.1 Prior to the first application for payment, submit for Contract Administrator's review an initial schedule of values. Modify the initial schedule of values if requested by the Contract Administrator. Obtain Contract Administrator's written acceptance of the initial schedule of values prior to the first application for payment.

.2 Together with the first and all subsequent applications for payment, submit updated versions of the schedule of values to indicate the values, to the date of application for payment, of work performed and Materials delivered to the Site.

.3 The schedule of values: Prices shall include line items identifying full costs for the following:

.1 Preparation of coordination and interference drawings in accordance with the requirements of Section 01 31 00, with a value not less than 0.5% of the Contract Price or $10,000.00, whichever is greater.

.2 To provide mock-ups in accordance with Section 01 45 00.

.3 Final cleaning, specified under Section 01 74 00, as distinct from progressive cleaning, also specified under Section 01 74 00.

.4 Preparation and submission of closeout submittals in accordance with the requirements of Section 01 78 00, with a value not less than 0.5% of the Contract Price or $10,000.00, whichever is greater.

.5 Preparation and submission of the deficiency list in accordance with the requirements of Section 01 77 00.

.4 Schedule of values to be submitted prior to review of first proper invoice. Make modifications and further breakdown pricing as required to meet Contract Administrator's approval.

1.4 Cash Flow Projection

.1 Prior to the first application for payment, submit for Contract Administrator's review, a forecast of approximate monthly progress payments for each month of the Contract Time.

.2 Submit revised cash flow forecasts monthly. Submit additional revised cash flow forecasts when there are significant changes in rate of progress of the Work or significant changes in the Contract Price as determined by the Contract Administrator. Submit additional revised cash flow forecasts when requested by Contract Administrator.

1.5 Payment for Products Stored Off Site

.1 City may, due to extraordinary circumstances and at City's sole discretion, make payments for Materials delivered to and stored at a location other than Site, subject to:

.1 A request submitted by Contractor in writing, with appropriate justification.

.2 Whatever conditions City or Contract Administrator may establish for such payments, as required to protect City's interests.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

Not applicable.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Building dimension, templates, built-ins, and coordination.

.2 Coordination and interference drawings.

.3 Superintendent.

.4 Discrepancies and clarifications.

.5 Request for Information (RFI) procedures.

1.2 Building Dimension, Templates, Built-ins, and Coordination

.1 Take necessary dimensions for the proper execution of the Work. Assume complete responsibility for the accuracy and completeness of such dimensions, and for coordination.

.2 Verify dimensions at the Site before commencing Shop Drawings. Before fabrication commences report discrepancies to Contract Administrator in writing. Incorporate accepted variances on shop drawings and as-built records.

.3 Supply forms, templates, anchors, sleeves, inserts and accessories required to be fixed to or inserted in the Work and set in place or instruct separate Subcontractors as to their location.

.4 Supply items to be built in, as and when required together with templates, measurements, shop drawings and other related information and assistance.

.5 Pay the cost of extra work and make up time lost as a result of failure to provide necessary information and items to be built in.

.6 Verify that the Work, as it proceeds, is executed in accordance with dimensions and positions indicated which maintain levels and clearances to adjacent work, as set out by requirements of the Contract Documents, and ensure that work installed in error is rectified before construction resumes.

.7 Check and verify dimensions referring to interfacing of services. Verify such dimensions with interconnected portions of the Work.

.8 Do not scale directly from drawings. Obtain clarification from Contract Administrator if there is ambiguity or lack of information.

.9 Details and measurements of any work which is to fit or to conform with work installed shall be taken at the Site.

.10 Prepare and submit setting drawings, templates and other information necessary for the location and installation of material, holes, sleeves, inserts, anchors, accessories, fastenings, connections and access panels.

.11 Subcontractors shall direct related Subcontractors on site of specific locations required for sleeves and openings.

1.3 Coordination and Interference Drawings

.1 The Contractor shall be responsible for preparing and submitting to the Contract Administrator for review, a consolidated set of installation coordination/interference drawings for the building showing how the building systems (including, but not limited to, domestic heating and cooling piping, air distribution systems, air control boxes, reheat coils, fire protection piping, electrical distribution, fire alarm systems, lighting, communication cabling, security cabling) will fit together above ceiling areas and in exposed ceiling, to allow ceiling heights required by the Contract Documents and by maintenance and control access.

.1 Each Subcontractor whose work is affected by the information presented on the coordination and interference drawings shall sign-off on the drawings prior to submission to the Contract Administrator and thereby agrees to coordinate their parts of the Work to preserve the coordination and interference guidelines represented by the coordination and interference drawings.

.2 Prepare sleeve drawings for work of Divisions 21, 22, and 23, and Divisions 26, 27, and 28 showing size and location of penetrations through load bearing elements. Submit sleeving drawings in electronic form to Contract Administrator for review not less than 10 Working Days prior to construction of affected work.

.3 Prepare embedded conduit drawings, showing size and location of penetrations through load bearing elements. Submit embedded conduit drawings in electronic form to Contract Administrator for review not less than 10 Working Days prior to construction of affected work.

.4 Prepare insert setting drawings for work to be cast into concrete and/or mortared into masonry elements. Submit insert setting drawings in electronic form to Contract Administrator for review not less than 10 Working Days prior to construction of affected work.

.5 Coordinate placement of equipment to ensure that components will be properly accommodated within spaces provided prior to commencement of Work. In areas where equipment and services are exposed care shall be taken to organize and layout services in an organized and orderly manner. Where possible services are to run parallel or at right angles to one another as required. Contract Administrator may request that service layout be reconfigured to suit sightline concerns during the coordination drawings review phase. These drawing changes are to be executed at no additional cost to the City.

.6 Take complete responsibility for remedial work that results from failure to coordinate the Work prior to fabrication and installation.

.7 Ensure that accesses and clearance required by jurisdictional authorities and/or for easy maintenance of equipment are provided in layout of equipment and services.

.1 Indicate required access points, clearances, and sizes for equipment and pieces of equipment required in the Work. Note areas where access is compromised by interferences with other services for review by the Contract Administrator. Do not proceed with installation of equipment in such compromised areas until a proposed means of providing access has been accepted by the Contract Administrator.

.8 Prepare and circulate coordination, interference and sleeving drawings prior to placing orders for equipment and materials.

.9 Coordination and interference drawings shall be circulated for mark-ups by Subcontractors responsible for work of Divisions 3, 5, 6, 9, 11, 13, 14, Divisions 21, 22, and 23, and Divisions 26, 27, and 28, as applicable.

.10 Coordinate preparation and submission of coordination and interference drawings with Shop Drawings.

.11 Show cross sections in key areas, as required, and as defined by Contract Administrator. Show re-bar, structural elements, piping, air handling and heating systems distribution, sprinkler system distribution, lighting, gypsum board wall and ceiling assemblies, acoustical isolation, Materials and systems involving life safety, conveying systems, electrical distribution.

.12 Show ductwork as 2 lines. Show cross sections in key areas, as required, and as directed by Contract Administrator. Show re-bar, structural elements, air handling and heating systems distribution, gypsum board wall and ceiling assemblies, acoustical isolation, Materials and systems involving life safety, conveying systems, and electrical distribution.

.13 Coordination and interference drawings shall be produced in uniform scale on media that will allow overlays to be assembled. Upon incorporation of details, drawings shall be submitted to Contract Administrator for review. Areas of conflict or interference shall be resolved in a mutually agreed manner between Subcontractors and resubmitted on coordination and interference drawings until accepted by Contract Administrator.

1.4 Superintendent

.1 Provide superintendent and necessary supporting staff personnel who shall be in attendance at the Site while Work is being performed, with proven experience in erecting, supervising, testing and adjusting projects of comparable nature and complexity.

.2 The Contractor shall appoint superintendent at the Site who shall have overall authority at the Site and shall speak for the Contractor and represent the Contractor's interest and responsibilities at meetings at the Site and in dealings with the Contract Administrator and the City.

.3 Site Superintendent to remain on Site until project competition for supervision, consistency and coordination. In the event that this person must change, the replacement is to be reviewed by the Contract Administrator.

1.5 Discrepancies and Clarifications

.1 Advise Contract Administrator of discrepancies discovered in requirements of the Contract Documents and request clarification in written form.

.2 Advise Contract Administrator when clarifications are required pertaining to meaning or intent of requirements of Contract Documents and request clarification from Contract Administrator in written form.

.3 Do not proceed with related work until written clarification is provided by Contract Administrator.

.4 Failure to notify Contract Administrator shall result in Contractor incurring responsibility for resulting deficiencies and expense at no additional cost to the City.

.5 Written requirements issued by Contract Administrator for the purpose of clarification, implicitly supersede applicable and relevant aspects of the Contract Documents irrespective of whether or not these documents are explicitly or specifically cited in clarification requests or clarification requirements.

1.6 Request for Information - RFI

.1 A Request for Information (RFI) is a formal process used during the Work to obtain an interpretation of the Contract Documents.

.1 An RFI shall not constitute notice of claim for a delay.

.2 Submittal procedures:

.1 RFI form:

.1 Submit RFI on City's "Request for Information" form, an example of which is appended to this section. The Contract Administrator shall not respond to an RFI except as submitted on this form.

.2 Where RFI form does not provide sufficient space for complete information to be provided thereon, attach additional sheets as required.

.3 Submit with RFI form necessary supporting documentation.

.2 Submit RFI form as follows:

.1 1 copy digitally in pdf format to Contract Administrator using the Contract Administrator's document management system.

.1 Refer to Section 01 11 00 "Electronic Files" paragraph.

.2 Submit RFIs sufficiently in advance of affected parts of the Work so as not to cause delay in the performance of the Work. Costs resulting from failure to do this will not be paid by the City.

.3 RFIs shall be submitted only to the Contract Administrator.

.4 RFIs shall be submitted only by Contractor. RFIs submitted by Subcontractors or suppliers shall not be accepted.

.5 Number RFIs consecutively in one sequence in order submitted.

.6 Submit one distinct RFI per RFI form.

.3 RFI log:

.1 Maintain log of RFIs sent to and responses received from the Contract Administrator, complete with corresponding dates.

.2 Submit updated log of RFIs with each progress draw submittal.

.4 Contract Administrator shall review RFIs from the Contractor submitted in accordance with this section, with the following understandings:

.1 Contract Administrator's response shall not be considered as a Change in Work, nor does it authorize changes in the Contract Price or Contract Time or changes in the Work.

.2 Only the Contract Administrator shall respond to RFIs. Responses to RFIs received from entities other than the Contract Administrator shall not be considered.

.5 Allow 10 Working Days for review of each RFI by the Contract Administrator.

.1 Contract Administrator's review of RFI commences on date of receipt by the Contract Administrator of RFI submittal and extends to date RFI returned by Contract Administrator.

.2 When the RFI submittal is received by Contract Administrator before noon, review period commences that day; when RFI submittal is received by Contract Administrator after noon, review period begins on the next Working Day.

.3 If, at any time, the Contractor submits a large enough number of RFIs such that the Contract Administrator cannot process these RFIs within 10 Working Days, the Contract Administrator, will confer with the Contractor within 3 Working Days of receipt of such RFIs, and the Contract Administrator and the Contractor will jointly prepare an estimate of the time necessary for processing the RFIs and determine the order of priority between the RFIs submitted. The Contractor shall accommodate such necessary time at no increase in the Contract Time and at no additional cost to the City.

.4 When RFI submittal has to be reviewed by one or more of Contract Administrator's subconsultants, add 5 more Working Days for a total 15 Working Day review period.

.6 Undertake a review of the Contract Documents to determine that the matter in question relating to the interpretation of the Contract Documents cannot be resolved by direct reference to the Contract Documents. Describe this review in detail on the RFI form. RFI submittals that lack a detailed review description, or where the detail provided is insufficient, in the sole opinion of the Contract Administrator, shall not be reviewed by the Contract Administrator and shall be rejected.

PART 2 - PRODUCTS
Not applicable.

PART 3 - EXECUTION
Not applicable.

END OF SECTION

Request for Information (RFI)

RFI No. 0

For details and instructions on how to complete this document, click the [¶] icon under the Home tab to display the hidden text.

RFI Title: | **RFI No.:** 0

Date RFI initiated: | **Date Response Requested by:**

Date Response Issued:

Project Name: d

Submitted To:			
Contract Administrator (CA):		Consultant Ref. No.	
Company/Dept.:		Tender No.	

Requested By:		***For CA Use***	
Name:		City File No.:	
Title:		Project ID:	
Company:		Project Record Index No.:	
Email::		Purchase Order No.:	

Request/Question: (to be completed by Contractor)

Answer/Response: (to be completed by Contract Administrator)

Attachment(s):

Distribution (to be completed by Contract Administrator)

- Contract Administrator
- Contractor
- City Project Manager
- Other:

PART 1- GENERAL

1.1 Section Includes

.1 Project meeting requirements.

1.2 Administrative

.1 The Contractor shall schedule meetings as specified herein, unless specified otherwise.

.1 Such scheduling shall be in consultation both with the City and with the Contract Administrator.

.2 The Contractor shall prepare agendas for meetings specified herein, unless specified otherwise.

.1 Agendas shall include, as a minimum, the agenda items specified in the Contract Documents.

.3 The Contractor shall distribute written notice of each meeting specified herein, unless specified otherwise, complete with meeting agenda, 5 Working Days in advance of meeting date to the Contract Administrator and the City and other affected parties.

.4 The Contractor shall chair and record the minutes of meetings specified herein, unless specified otherwise.

.1 Contractor shall distribute copies of minutes to the City, the Contract Administrator, and all others in attendance within 3 Working Days after date of meeting.

.5 Representatives of parties attending meetings shall be authorized to act on behalf of the parties they represent.

.6 Subcontractors and suppliers shall attend meetings only when directed by the Contract Administrator, or when specifically called for in the Contract Documents.

.7 The Contractor shall prepare, and distribute to the Contract Administrator and the City 4 days in advance of next progress meeting date, the following:

.1 Monthly progress reports containing updated construction schedule, submittal logs, Request for Information logs, and budget.

1.3 Contract Start-Up Meeting

.1 Within 5 days after award of Contract, request a meeting of parties in Contract to discuss and resolve administrative procedures and responsibilities prior to the commencement of the Work.

.1 The Contract Administrator shall chair and minute the Contract start-up meeting, and distribute minutes as described above in Section 01 31 19.

.2 Attendees at Contract start-up meeting shall include the following, at the discretion of the Contract Administrator:

.1 Contractor.

.2 Contractor’s site superintendent(s).

.3 Contractor’s LEED coordinator.

.4 Contractor's waste management coordinator.

.5 Contractor's mechanical and electrical coordinator.

.6 Contract Administrator.

.7 City.

.8 *Integrated testing coordinator.*

.9 Mechanical Subcontractor.

.10 Electrical Subcontractor.

.3 Agenda to include the following:

.1 General:

.1 Welcome and Introduction.

.2 City's guidelines and policies.

.3 Communications:

.1 Appointment of official representatives of the participants on the project.

.2 Project contact list.

.3 Emergency contact list.

.4 Correspondence protocols (email, telephone, Newforma).

.4 Schedule of progress meetings.

.5 Status of permits, fees and requirements of the authorities having jurisdiction.

.6 Integrated fire protection and life safety systems testing requirements and procedures (refer to Section 01 91 26).

.7 Status of Contract execution.

.8 Insurance, transcripts of policies.

.9 Clearance Certificate from the Workers' Compensation Board (WCB).

.10 Documents at the Site (Permit Set, Issued Incorporating Addenda Set / Issued for Construction).

.2 Contract Modifications and Instructions:

.1 Requirements for Contract Modification and interpretation procedures:

.1 Requests for Information.

.2 Field Instruction.

.3 Proposed Change Notices and Orders.

.4 Changes in Work.

.2 Procedures for distribution, approvals, requests for time extension.

.3 Submittals:

.1 Construction schedule.

.2 Submittal procedures and schedule of submittals.

.3 Requests for Substitutions / Alternates.

.4 Delivery of specified equipment and “long-lead” items.

.5 City supplied products.

.4 Newforma – Document management control.

.5 Proper invoice including Schedule of Values, progress claims, administrative procedures and holdbacks.

.6 Sustainability Requirements: LEED, other (project specific).

.7 Site Policies and Logistics.

.1 Contractor’s safety procedures.

.2 Site issues and limitations:

.1 Parking.

.2 Site access, loading and storage.

.3 Garbage and construction waste handling.

.4 Hazardous substances.

.3 Site security.

.4 Temporary Work.

.5 Quality control.

.6 Insect control.

.8 Project Close Out:

.1 Take-over procedures, acceptance and warranties.

.2 Publication to be used for publishing certificate of Substantial Performance.

.3 As-built drawings.

.4 Operation and Maintenance manuals.

.5 City Training.

.6 Substantial Performance.

1.4 LEED Start-Up Meeting

.1 Conduct a LEED kick-off meeting in accordance with Section 01 33 29.

1.5 Pre-Installation Meetings

.1 During the course of the Work prior to Substantial Performance, schedule pre-installation meetings as required by the Contract Documents and coordinated with the Contract Administrator.

.2 As far as possible, pre-installation meetings shall be scheduled to take place on the same day as regularly scheduled progress meetings.

.3 Attendees at pre-installation meetings shall include the following:

.1 Contractor.

.2 Contractor's LEED coordinator.

.3 Contractor's waste management coordinator.

.4 Subcontractors affected by the work for which the pre-installation meeting is being conducted.

.5 Contract Administrator.

.6 Manufacturer's representatives, as applicable.

.7 Independent inspection and testing company, as applicable.

.4 Agenda to include the following:

.1 Appointment of official representatives of participants in the project.

.2 Review of existing conditions and affected work, and testing thereof as required.

.3 Review of installation procedures and requirements.

.4 Review of environmental and site condition requirements.

.5 Schedule of the applicable portions of the Work.

.6 Schedule of submission of submittals, samples, mock-ups, and items for Contract Administrator's consideration.

.7 Requirements for Temporary Work.

.8 Requirements for notification for reviews. Allow a minimum of 48 hours' notice to Contract Administrator for review of the Work.

.9 Requirements for inspections and tests, as applicable. Schedule and undertake inspections and tests.

.10 Delivery schedule of specified equipment.

.11 Special safety requirements and procedures.

.12 Review LEED strategy and requirements.

1.6 Progress Meetings

.1 During the course of the Work prior to Substantial Performance, schedule regular progress meetings to occur every other week.

.2 Attendees at progress meetings shall include the following, at the discretion of the Contract Administrator:

.1 Contractor.

.2 Contractor's site superintendent(s).

.3 Contractor's LEED coordinator.

.4 Contractor's waste management coordinator.

.5 Contractor's mechanical and electrical coordinator.

.6 Contract Administrator.

.7 City.

.8 Province of Manitoba representative.

.9 Mechanical Subcontractor.

.10 Electrical Subcontractor.

.3 Agenda to include the following:

.1 Review, approval of proceedings of previous meeting.

.2 Review of items arising from proceedings.

.3 Review of progress of the Work since previous meeting and Contractor's monthly progress report.

.4 Field observations, problems, conflicts.

.5 Update construction schedule.

.6 Problems that impede compliance with construction schedule.

.7 Review of off-site fabrication delivery schedules.

.8 Review material and equipment delivery dates/schedule.

.9 Corrective measures and procedures to regain construction schedule.

.10 Revisions to construction schedule.

.11 Progress, schedule, during subsequent period of the Work.

.12 Review submittal schedules.

.13 Review status of submittals.

.14 Review of waste management and disposal procedures and reports.

.15 Maintenance of quality standards.

.16 Pending changes and substitutions.

.17 Review of Contract modifications and interpretations including, but not limited to: Requests for Information and log, contemplated Changes in Work, Changes in Work, Orders, and Field Instructions for effect on construction schedule and on Contract Time.

.18 Review of status of as-built documents.

.19 Review LEED strategy, status, and requirements.

.20 Other business.

1.7 Pre-Takeover Meeting

.1 60 days prior to application for Substantial Performance, schedule a pre-takeover meeting.

.2 Agenda to include the following:

.1 Review, approval of proceedings of previous meeting.

.2 Review of items arising from proceedings.

.3 Review of procedures for Substantial Performance, completion of the Contract, and handover of the Work.

.4 Field observations, problems, conflicts.

.5 Review of outstanding Contract modifications and interpretations including, but not limited to: Requests for Information and log, contemplated change orders, Changes in Work, and Field Instructions for effect on construction schedule and on Contract Time.

.6 Problems which impede Substantial Performance.

.7 Review of procedures for deficiency review. Corrective measures required.

.8 Review of arrangements for hydro, heating, and other services.

.9 Review of integrated fire protection and life safety systems testing requirements and procedures (refer to Section 01 91 26).

.10 Progress, schedule, during succeeding period of the Work.

.11 Review submittal requirements for warranties, manuals, and all demonstrations and documentation required for Substantial Performance.

.12 Review of keying and hardware requirements.

.13 Review of status of as-built documents and record drawings.

.14 Status of commissioning and training.

.15 Review Contractor's deficiency list and status.

.16 Cleaning for occupancy.

.17 Other business.

1.8 Post-Construction Meeting

.1 Prior to application for completion of Contract, schedule a post-construction meeting. 5 Working Days prior to date for meeting, Contract Administrator shall confirm a date for meeting based on evaluation of completion requirements.

.2 Agenda to include the following:

.1 Review, approval of proceedings of previous meeting.

.2 Confirmation that no business is arising from proceedings.

.3 Confirmation of completion of the Contract, and handover of reviewed documentation from the Contract Administrator to the City.

.4 Confirmation of completion of contemplated change orders, Changes in Work, and Field Instructions.

.5 Problems that impede Contract completion.

.6 Identify unresolved issues or potential warranty problems.

.7 Confirmation of completion of deficiencies.

.8 Corrective measures required.

.9 Confirmation of arrangements for hydro, heating and other services.

.10 Confirm submittal requirements for warranties, manuals, and demonstrations and documentation for Contract completion are in order.

.11 Review of procedures for communication during post-construction period.

.12 Handover of reviewed record documents by the Contractor to the City.

.13 Submission of final application for payment.

.14 Review and finalize outstanding claims, pricing, and allowance amounts.

.15 Status of commissioning and training.

.16 Demobilization and the Site restoration.

.17 Review of Requests for Information log.

.18 Other business.

1.9 Special Meetings

.1 City and/or Contract Administrator reserves the right to require special meetings which may be held on short notice and at which attendance by Contractor and representatives of affected Subcontractors and suppliers is mandatory. Contractor shall keep detailed and accurate meeting notes and distribute copies within 3 Working Days to all in attendance and those affected by agreements made at such meetings.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

Not applicable.

END OF SECTION

PART 1- GENERAL

1.1 Section includes

.1 Construction progress schedule.

.2 Submittals schedule.

.3 Inspection and testing schedule.

.4 Schedule management.

.5 Recording actual site conditions on as-built documents.

.6 Digital photographs.

1.2 Summary

.1 This Section specifies Contractor's responsibilities for preparation and submission of schedules and other documentation related to tracking construction progress.

.2 The schedule shall:

.1 Show actual progress versus planned progress.

.2 Demonstrate that scheduling issues are being proactively identified and addressed in a timely manner, and that planned progress is being maintained as closely as possible.

1.3 Schedule Format

.1 Prepare schedules in the form of a Critical Path Method (CPM) Gantt chart method utilizing the following software:

.1 Prepare schedules utilizing Microsoft Project 2003 (or later version).

.2 Include horizontal time scale identifying the first Working Day of each week.

.3 Include a separate bar for each trade, work package, or operation.

.4 Format for listings: The chronological order of the start of each item or part of the Work.

.5 Identification of listings: By systems description.

1.4 Construction Progress Schedule

.1 Format and content:

.1 Include the complete sequence of construction activities, including provision for climate and weather.

.2 Provide a work breakdown structure identifying key activities, work packages, and major milestones at a sufficient level of detail to effectively manage construction progress, including:

.1 Long delivery Materials.

.2 Dates for the commencement and completion of inspection and testing.

.3 Preparation and review of mock-ups.

.4 City decisions for cash allowances.

.5 Shutdown or closure activities.

.6 Delivery of items supplied by City.

.7 City performed work.

.8 Demonstration and training activities.

.9 Dates for the commencement and completion of each major element of the Work parallel to the sections of the specifications.

.10 Date for Substantial Performance.

.11 Dates for delivery of Materials, equipment, finish items, factory-finished manufactured items. Show last dates for order, shipment, and delivery in order to meet construction schedule.

.3 Show projected percentage of completion for each item as of the first Working Day of each week.

.4 Refer also to Supplementary Conditions D17.

.2 Submission:

.1 Submit initial schedule to City and Contract Administrator within 10 Working Days after Contract award.

.2 Submit schedule in pdf format to Contract Administrator using the Contract Administrator's document management system.

.1 Refer to Section 01 11 00 "Electronic Files" paragraph.

.3 Contract Administrator will review format and content of initial schedule and request necessary changes, if any, within 10 Working Days after receipt.

.4 If changes are required, resubmit finalized initial schedule within 5 Working Days after return of review copy.

.5 Submit updated progress schedule to City and Contract Administrator at each regularly scheduled progress meeting in accordance with Section 01 31 19. In addition to requirements specified in Section 01 32 00 for each submission of construction schedule, include a written report on the activities completed in the week preceding the progress meeting, and a summary indicating the activities planned to be undertaken in the 2 weeks subsequent to the progress meeting, including human resource loading.

.6 Submit updated progress schedule to City and Contract Administrator with each application for progress payment, indicating actual and projected start and finish dates with report date line and progress. Submit more frequently if requested by City or Contract Administrator.

.7 At each date of submission of construction schedule, indicate progress of each activity.

.1 Show changes occurring since previous submission of the construction schedule:

.1 Major changes in scope.

.2 Change Work Orders.

.3 Activities modified since previous submission.

.4 Revised projections of progress and completion.

.5 Other identifiable changes.

.2 Include a narrative report to define:

.1 Problem areas, anticipated delays, and the impact on the schedule.

.2 Corrective action recommended and its impact on the schedule.

.3 Include cash flow projection with minimum look ahead as directed by the Contract Administrator.

1.5 Submittals Schedule

.1 Format and content:

.1 Prepare a detailed schedule of submittals required by the Contract Documents, including samples required for testing, and including those for items supplied by City.

.2 Provide a separate line for each required submittal, organized by Specifications section names and numbers, and further broken down by individual Materials and systems as required.

.3 Indicate dates for submitting, review time, resubmission time, float time, and last date for meeting construction schedule.

.4 Schedule submissions of submittals well in advance of scheduled dates for installation, to provide lead time for reviews and possible resubmissions and for placing orders and securing delivery so as to avoid delays in the Work.

.5 Make provisions in schedule for at least 10 Working Days for Contract Administrator's review of submittals. When submittals have to be reviewed by one or more of Contract Administrator's subconsultants, add 5 more Working Days for a total 15 Working Days review period.

.6 If the Contract Administrator requires resubmission of submittals, allow for an additional 10 Working Days review for each resubmission.

.7 If, at any time, the Contractor submits a large enough number of submittals such that the Contract Administrator cannot process these submittals within 10 Working Days, the Contract Administrator, in consultation with the Contractor within 3 Working Days of receipt of such submittal, will provide the Contractor with an estimate of the time necessary for processing same. The Contractor shall accommodate such necessary time at no increase in the Contract Time and at no additional cost to the City.

.8 Changes in the construction schedule shall maintain the minimum review periods for the Contract Administrator's review specified above.

.2 Submission:

.1 Submit initial schedule to Contract Administrator within 15 Working Days after Contract award.

.2 Submit schedule in pdf format to Contract Administrator using the Contract Administrator's document management system.

.1 Refer to Section 01 11 00 “Electronic Files” paragraph.

.3 Contract Administrator will review format and content of initial schedule and request necessary changes, if any, within 10 Working Days after receipt.

.4 Contract Administrator will review submittal schedule and advise Contractor if volume and timing of submittals will permit review of and response to submittals within timeframes specified under Section 01 32 00. Contract Administrator may require modifications to submittals schedule in order to allow adequate time for review of submittals. Adjust submittals schedule and construction schedule as required to comply with Contract Administrator’s needs.

.5 If changes are required, resubmit finalized schedule within 5 Working Days after return of review copy.

.6 Submit updated submittals schedule monthly to the Contract Administrator or more frequently as directed by the Contract Administrator.

.7 Schedule shall be accompanied by a checklist, correlated to each of the schedule of submittals, the construction schedule, and the schedule of inspections and tests, listing the following:

.1 Shop Drawings.

.2 Samples.

.3 Mock-ups.

.4 Reviews, tests and inspections by:

.1 Manufacturers.

.2 Authorities having jurisdiction.

.3 The City.

.4 The Contract Administrator.

.5 Independent inspection and testing companies.

.5 Demonstration and training.

1.6 Inspection and Testing Schedule

.1 Prepare schedule for inspection and testing by advance discussion with the selected independent inspection and testing company to determine the time required for the independent inspection and testing company to perform its tests and to issue each of its findings, and allow for required time in the construction schedule.

.2 Refer to Section 01 45 00 for additional requirements for inspection and testing scheduling.

1.7 Schedule Management

.1 A schedule submitted as specified and accepted by Contract Administrator shall become the baseline schedule and shall be used as the baseline for updates.

.2 At each regular progress meeting, review and discuss current construction progress and submittals schedules with Contract Administrator and City, including activities that are behind schedule and planned measures to regain schedule slippage in key areas on or near the critical path.

.3 Activities considered behind schedule are those with start or completion dates later than the dates shown on the baseline schedule.

1.8 Recording Actual Site Conditions on As-Built Documents

.1 Contractor to maintain on site 1 set of Contract Documents for as-built documentation purposes. Record information and maintain as-built documents on Site in clean, dry and legible condition.

.2 Clearly label each drawing as “AS-BUILT DRAWING” and each specification “AS-BUILT SPECIFICATION” and each schedule “AS-BUILT SCHEDULE”. Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.3 Accurately document as-built conditions and deviations from Contract Documents as the Work progresses.

.4 Mark changes in red ink.

.5 Document actual construction including:

.1 Survey of as-built conditions and survey logs prepared by the registered land surveyor responsible for setting out the work and field engineering.

.2 Depths of various elements of foundation in relation to survey datum.

.3 Horizontal and vertical location of utilities and appurtenances referenced to permanent surface improvement.

.4 Other underground installations and services set beneath slabs-on-grade referenced to visible and accessible features of structure.

.5 ‘As-built’ elevations of paving, sidewalks, manholes and catchbasins.

.6 Field changes of dimensions/details.

.7 Changes by Changes in Work and Field Instructions.

.8 References to Shop Drawings, where Shop Drawings show more detail.

.9 Locations of interior mechanical and electrical equipment and distribution.

.10 Elevations and location depths of services. Identify type and size of service and materials used.

.11 In specification as-builts: Document as-built Materials, including manufacturer, manufacturer’s model or system number.

.6 Do not use as-built drawings for construction purposes.

1.9 Digital Photographs

.1 Provide photographic documentation in digital format and in accordance with procedures and submission requirements specified in this section.

.1 No other photographs of the Site or of any portion of the Work will be permitted without written approval of the City.

.2 Equipment: Provide photographs using minimum 10 megapixel digital camera.

.3 Submit the required photographs to the Contract Administrator and to the City.

.4 Output: Supply date stamped maximum resolution colour photos to Contract Administrator in JPEG format, on USB Flash Drive or via file transfer.

.5 Number of photos required:

.1 Prior to construction: Provide necessary number of photographs, as required to document existing conditions and verify damage to adjacent streets and property that may have existed prior to construction or demolition work: Minimum 50 photos.

.2 Each Progress draw: Provide 24 construction photographs each month to accompany each application for progress draw to document the stage of the Work from points selected by the Contract Administrator showing as much as possible of the Work installed during the previous month.

.3 Provide minimum of 8 photographs on each meeting report and for each progress meeting.

.4 Completion: When the Work is completed, arrange to take final photographs of the Work from a minimum of 8 points of view.

PART 2 - PRODUCTS
Not applicable.

PART 3 - EXECUTION
Not applicable.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Administrative requirements.

.2 Submission procedures.

.3 Material data sheets.

.4 Shop Drawings.

.5 Engineered Judgements.

.6 Project firestopping manual and coordination.

.7 Samples.

1.2 Administrative Requirements

.1 Submit submittals as requested by the Contract Documents, as specified herein, and in accordance with the submittals schedule prepared in accordance with Section 01 32 00.

.2 In addition to submittals specifically requested by the Contract Documents, submit other submittals as may be reasonably requested by the Contract Administrator, or as are required to coordinate the Work and to provide the City with choices available, within the scope of Contract Documents.

.3 Where required by authorities having jurisdiction, provide submittals to such authorities for review and approval.

.4 Make submittals with reasonable promptness and in an orderly sequence so as to cause no delay in the Work. Be solely responsible for delays, make up time lost, and pay added costs incurred because of not making submittals in due time to permit proper review by Contract Administrator.

.5 Once submitted, a submittal shall not be re-submitted until original submission has been reviewed by Contract Administrator and returned to Contractor.

.6 Submittals that contain substitutions will be rejected. Substitutions are permitted only in accordance with Section 01 25 00.

.7 Do not proceed with work affected by a submittal, including ordering of Materials, until relevant submittal has been reviewed by Contract Administrator.

.8 Prepare submittals using SI (metric) units.

.9 Contractor’s responsibility for deviations in submittal from requirements of Contract Documents is not relieved by Contract Administrator’s review of submittal, unless Contract Administrator gives written acceptance of specific deviations.

.10 Keep copies of reviewed submittals at the Site in an organized condition. Only submittals that have been reviewed by the Contract Administrator and include the Contract Administrator's Submittal Review Form, as applicable, are permitted at the Site.

.11 The Work shall conform to reviewed submittals subject to the requirements of this section. Remove and replace materials or assemblies not matching reviewed submittals at no increase in the Contract Time and at no additional cost to the City.

.12 Contractor's review of submittals:

.1 Review submittals for conformity to Contract Documents before submitting to Contract Administrator. Submittals shall bear stamp of Contractor and signature of a responsible official in Contractor's organization indicating in writing that such submittals have been checked and coordinated by Contractor. Review shall be performed by qualified personnel who have detailed understanding of those elements being reviewed and of the conditions at the Site proposed for installation.

.2 Check and sign each submittal and make notations considered necessary before submitting to Contract Administrator for review. Where submittal is substantially and obviously in conflict with requirements of Contract Documents, reject submittal without submitting to Contract Administrator and request resubmission. Note limited number of reviews of each submittal covered under Contract Administrator's services as specified below.

.3 Assume sole responsibility for any conflicts occurring in the Work that result from lack of comparison and coordination of submittals required for the Work.

.4 Assume sole responsibility for dimensions to be confirmed and correlated at the Site for information that pertains to fabrication processes or to techniques of construction and installation, and for coordination of the Work.

.5 Submittals that have not been reviewed, checked, and coordinated by Contractor prior to submission to Contract Administrator, or that do not bear the stamp and signature of Contractor as described above, will be stamped "REVISE AND RESUBMIT" and returned.

.6 No changes to the Work or the Contract Documents shall be made by way of submittals.

.1 Changes to the Work shall only be made following procedures specified for changes in the Work.

.2 Submittals that include changes to the Work or the Contract Documents shall be shall be stamped "REVISE AND RESUBMIT" and returned.

.13 Contract Administrator's review of submittals:

.1 Review of submittals by Contract Administrator is for the sole purpose of ascertaining conformance with the general design concepts and the general intent of the Contract Documents. This review shall not mean that Contract Administrator approves the detail design inherent in the submittals, responsibility for which shall remain with the Contractor. Such review shall not relieve the Contractor of responsibility for errors or omissions in the submittals, nor of responsibility for meeting requirements of Contract Documents.

.2 The Contract Administrator shall review Shop Drawings no more than twice. Should three or more reviews be required due to reasons of Contractor omissions causing resubmission requests, then the Contractor shall reimburse the City for time expended in these extra reviews. Time shall be deducted from monies due to the Contractor at rates recommended by Contract Administrator's professional association and disbursements shall be invoiced at Contract Administrator's cost. The Contractor shall cover direct administration costs associated with courier services and the like for these extra Shop Drawings reviews.

.3 Contract Administrator's review and markings on submittals do not authorize changes in the Work nor in the Contract Time, and shall be accommodated at no additional cost to the City. If, in the opinion of the Contractor, the Contract Administrator's markings on submittals constitute a change in the Work or will effect a change in the Contract Time, then the Contractor shall so notify the Contract Administrator in writing and request an interpretation following the procedures for Requests for Information in accordance with Section 01 31 00. If the Contract Administrator finds that the Contract Administrator's markings on submittals do constitute a change in the Work or will effect a change in the Contract Time, then a Change in Work will be prepared therefore. The time taken to process such a Request for Information shall not, in and of itself, constitute a change in the Work nor an increase the Contract Time.

.4 Submittals that are not required by the Contract Documents or not requested by the Contract Administrator will not be reviewed by the Contract Administrator and will be marked 'NOT REVIEWED' by the Contract Administrator and returned to the Contractor.

.14 Engineered submittals:

.1 Submittals for items required to be sealed by professional engineer (engineered) shall be duly prepared, sealed, and signed under the direct control and supervision of a qualified professional engineer licensed in the jurisdiction in which the Site is located, having in force professional liability insurance with minimum coverage limit of $5,000,000 per claim and annual aggregate.

.2 Include with engineered submittal, proof of insurance identifying insurer, policy number, policy term, and limit of liability, on duly signed letterhead and / or certificates of insurance.

.3 Design includes life safety, sizing of supports, anchors, framing, connections, spans, and as additionally required to meet or exceed requirements of applicable codes, standards, regulations, authorities having jurisdiction, and design requirements of the Contract Documents.

.4 Engineered submittals shall include design calculations, complete with references to codes and standards used in such calculations, supporting the proposed design represented by the submittal.

.5 Professional engineer responsible for the preparation of engineered submittals shall undertake periodic field review, including review of associated mock-ups where applicable, at locations wherever the work as described by the engineered submittal is in progress, during fabrication and installation of such work, and shall submit a field review report after each visit. Field review reports shall be submitted to the Contract Administrator, to authorities having jurisdiction as required, and in accordance with the building code.

.6 Field reviews shall be at intervals as necessary and appropriate to the progress of the work described by the submittal to allow the engineer to be familiar with the progress and quality of such work and to determine if the work is proceeding in general conformity with the Contract Documents, including reviewed shop drawings and design calculations.

.7 Upon completion of the parts of the Work covered by the engineered submittal, the professional engineer responsible for the preparation of the engineered submittal and for undertaking the periodic field reviews described above, shall prepare and submit to the Contract Administrator and authorities having jurisdiction, as required, a Letter of Assurance Schedule A for those parts of the Work, certifying that they have been provided in accordance with the requirements both of the Contract Documents and of the authorities having jurisdiction over the Site.

.8 Costs for such field reviews and field review reports and Letters of Assurance are included in the Contract Price.

1.3 Submission Procedures

.1 Coordinate each submittal with requirements of the Work and Contract Documents. Individual submittals shall include related information.

.2 Distribute copies of submittals to parties whose work is affected by submittals except Contract Administrator and City before final submission for review by Contract Administrator.

.3 Accompany submittals with transmittal letter containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Contractor's review stamp.

.5 Identification and quantity of each submittal.

.6 Other pertinent data.

.4 Each submittal shall be identified numerically by relevant Specifications section number with a numeric indicator for multiple submittals by that section followed by revisions number, for example 04 05 19-01-R0.

.5 Submit original PDF documents only: scanned documents shall not be accepted.

.1 PDF submittals shall be bookmarked and linked to a Table of Contents or cover letter identifying the contents of the submission.

.6 Make any changes in submittal that Contract Administrator may require, consistent with Contract Documents, and resubmit as directed by Contract Administrator.

.7 Notify Contract Administrator, in writing, when resubmitting, of any revisions other than those requested by Contract Administrator.

.8 After Contract Administrator's review, distribute copies to affected parties.

1.4 Material Data Sheets

.1 Submit Material data sheets as follows:

.1 1 copy digitally as a bookmarked PDF to Contract Administrator using the Contract Administrator's document management system.

.1 Refer to Section 01 11 00 "Electronic Files" paragraph.

.2 Submit Material data sheets as called-for by the Contract Documents or as the Contract Administrator may reasonably request where shop drawings will not be prepared due to a standardized manufacture of a Material. Manufacturers' catalogue cuts will be acceptable in such cases, providing that they are 213 mm x 275 mm (8-1/2" x 11") originals, and that they indicate choices including sizes, colours, model numbers, options and other pertinent data, including installation instructions. Submissions showing only general information are not acceptable.

.1 In addition, submit written requirements for Material handling (handling and storage) in accordance with Section 01 60 00.

.3 Where requirements of Contract Documents are more stringent than design proposed on Material data sheets, the requirements of the Contract Documents take priority.

.4 Upon completion of review by Contract Administrator, 1 marked set of Material data sheets will be returned to Contractor in digital format for reproduction and distribution.

.5 Retain 1 complete set of reviewed Material data sheets for issuance as part of closeout submittals in accordance with Section 01 78 00.

1.5 Shop Drawings

.1 Submit Shop Drawings as follows:

.1 1 copy digitally as a bookmarked PDF to Contract Administrator using the Contract Administrator’s document management system.

.1 Refer to Section 01 11 00 “Electronic Files” paragraph.

.2 Lettering on Shop Drawings shall be not less than 3 mm (1/8") high.

.3 Reproduction of construction Drawings to serve as background for Shop Drawings is not permitted.

.4 Where requirements of Contract Documents are more stringent than design proposed on Shop Drawings, the requirements of the Contract Documents take priority.

.5 Contract Administrator markings and resulting action required:

.1 Shop Drawings requiring no changes will be marked 'REVIEWED', and shall be submitted for as-built drawings purposes.

.2 Shop Drawings requiring several changes will be marked 'REVIEWED as NOTED' and shall be revised and submitted for as-built drawings purposes.

.3 Shop Drawings requiring substantial changes will be marked 'REVISE AND RE-SUBMIT' and shall be revised and resubmitted until Contract Administrator stamps Drawings with 'REVIEWED' or 'REVIEWED as NOTED'.

.6 Shop Drawings size shall be multiple of 213 mm and 275 mm (8-1/2" and 11") excluding 38 mm (1-1/2") binding margin and not larger than 838 mm x 1117 mm (33" x 44"). Leave minimum 150 mm x100 mm (6" x 4") clear space for Contract Administrator’s comments.

.7 Upon completion of review by Contract Administrator, 1 marked set of Shop Drawings will be returned to Contractor in digital format for reproduction and distribution.

.8 Retain 1 complete set of reviewed Shop Drawings for issuance as part of closeout submittals in accordance with Section 01 78 00.

.9 Submit copies of reviewed Shop Drawings to authorities having jurisdiction as required.

.10 Shop Drawings shall include:

.1 Fabrication and erection dimensions.

.2 Plans, sections, elevations, arrangements and sufficient full size details which indicate complete construction, components, methods of assembly as well as interconnections with other parts of the Work.

.3 Design calculations for items that require design calculations.

.4 Clear definition of the division of responsibility for the work described thereon. No Materials, items or equipment, or description of work, shall be indicated to be supplied, or work to be done, “By Others” or “By Purchaser”. Shop Drawings marked with either of these phrases shall be rejected without having been reviewed by the Contract Administrator.

.5 Location and type of exposed anchors, attachments and locations and types of fasteners, including concealed reinforcements to accept mounted fasteners.

.6 Adhesives, joinery methods and bonding agents.

.7 Kinds and grades of materials, their characteristics relative to their purpose, detailed description of finishes and other fabrication information.

.8 Configurations, types and sizes required; identify each unit type on drawing and on Material.

.9 Descriptive names of equipment and mechanical and electrical characteristics when applicable.

.10 Data verifying that superimposed loads will not affect function, appearance and safety or work shown on shop drawings, as well as other interconnected work.

.11 Assumed design loadings, dimensions of elements and material Specifications for load-bearing members.

.12 Proposed chases, sleeves, cuts and holes in structural members.

.13 Wall thicknesses of metals.

.14 Location and types of welds. For structural welds use AWS symbols and clearly show net weld lengths and sizes.

.15 Materials, gauges, and sizes being supplied including connections, attachments, reinforcement, anchorage and locations of exposed fastenings.

.16 Installation instructions and details for Materials to be installed by separate Subcontractors, including function of each part.

.17 A list of Materials covered by, or included on, the shop drawing. List of Materials shall be complete and show manufacturer's name, Material name, generic description, standard certification where specified, manufacturer's complete installation data and precautions against wrong installation, operation and maintenance.

.18 Refer to individual sections of the Specifications for more particular requirements for Shop Drawings.

.19 Compatibility statement: Include with each Shop Drawings a statement that each Material and material indicated on the Shop Drawings is compatible with each Material and material with which it comes into contact.

1.6 Engineered Judgements

.1 When an engineered judgement is required by authorities having jurisdiction, such engineered judgement shall be prepared as an engineered submittal in accordance with Section 01 33 00.

1.7 Project Firestopping Manual and Coordination

.1 The Contractor shall assign a firestopping and smoke seal firestopping coordinator to coordinate the firestopping details and systems required in the Work. Applicator shall designate a single individual as project foreperson who shall be present at the Site throughout the Work.

.2 Firestopping manual:

.1 Contractor and firestopping and smoke seal coordinator shall prepare a preliminary fire stopping manual, inclusive of all firestopping systems in the Work, to be submitted to the Contract Administrator prior to the installation of any firestopping and smoke seal work.

.2 Manual shall include:

.1 Project key plans of each level, with enlarged key plans at areas where required, which identify and tag each anticipated penetration and fire stopping location and type (i.e. multiple metallic pipes though gypsum board wall assembly; single metallic pipe though concrete floor assembly, and the like).

.2 Material data sheets: data and installation instructions for Materials providing descriptions sufficient for identification at the Site.

.1 Materials list of Materials proposed for use in the Work; complying with listed systems designs.

.2 Listing agency's detailed drawing showing joint assemblies and firestopping materials, identified with listing agency's name and number or designation, fire rating achieved, and date of listing.

.3 Manufacturers' installation instructions and recommendations.

.3 Shop Drawings:

.1 Submit drawings indicating fire resistance rated assembly number, required temperature, hose stream, and flame rating, material thicknesses, installation methods and materials of firestopping and smoke seals, primers, supports, damming materials as applicable, reinforcements, anchorages, fastenings and methods of installation for each condition to be encountered.

.2 Designate on Shop Drawings static through penetrations and dynamic joint systems, relative positions, expansion and control joints in rated slabs and walls, and firestopping details.

.3 Engineered Shop Drawings; for engineering judgements:

.1 Where project conditions require modification to an accredited third party testing agency's listed system design to address a particular firestopping condition that is not covered by a listed system, submit engineered shop drawings detailing the modifications to the listed system design as an engineering judgment or equivalent fire-resistance-rated assembly, for each project location and condition.

.2 Submit the manufacturer's engineering judgment identification number and Shop Drawings details prepared by a professional engineer. The engineering judgment submittal shall include both project name, project location, and Subcontractor's name who will install firestop system as described in engineering judgement Shop Drawings.

.3 Provide complete details of specific application of listed system and its modifications upon which the engineered judgement is based upon.

.4 For perimeter fire barrier systems:

.1 Submit engineered Shop Drawings for engineering judgements covering perimeter fire barrier systems. Identify each cladding assembly type in contact with each perimeter fire barrier system.

.4 Fire resistance rating test listings for firestopping and smoke seal systems.

.3 Firestopping manual shall be submitted within 4 weeks of Contract award.

.4 Prior to concealment of firestopping conditions above a ceiling or by another assembly or finish, the Contractor shall submit an updated firestopping manual including as-built drawings that identify firestopping conditions and penetrations.

.3 Closeout submittals:

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Submit the following certification documents with closeout submittals:

.1 Manufacturer's certification: Submit manufacturer's certification that installed firestopping and smoke seal Materials are suitable for the use indicated and comply with specified requirements.

.2 Installation certification: Installer shall submit certification that all joint firestopping system installations are completed and that installations comply with listed systems designs.

.3 As-built copy of the firestopping manual.

1.8 Samples

.1 Except where a different amount is specified, submit a minimum of 3 samples. Otherwise submit the number of samples specified.

.2 Deliver samples to the following location with expenses, including carrying costs, prepaid, unless otherwise instructed:

.1 1 copy: Diamond Schmitt Architects' office: 384 Adelaide Street West, Suite 100, Toronto, ON.

.2 1 copy: Brook McIlroy Architects' office: 91 Albert Street, Unit 1, Winnipeg, MB.

.3 Identify samples or assemblies by project number and name, name of Contract Administrator, Contractor and Subcontractor, and date of submission. Identify location, specified material reference and any other pertinent information. Show construction by layered method if necessary, clearly displaying textures and patterns.

.4 Where a required colour, pattern or texture has not been specified, submit full range of available Materials meeting other specified requirements.

.5 Contract Administrator selection from samples is not intended to change the Contract Price or Contract Time. If a selection would affect the Contract Price or Contract Time, notify Contract Administrator in writing prior to proceeding with the Work.

.6 Resubmit samples until written acceptance is obtained from Contract Administrator.

.7 Reviewed and accepted samples will establish the standard against which installed Work will be reviewed.

PART 2 - PRODUCTS
Not applicable.

PART 3 - EXECUTION
Not applicable.

END OF SECTION

PART 1 – GENERAL

1.1 Section Overview

.1 LEED requirements and procedures

1.2 Related Sections

.1 Section 01 57 13 - Temporary Erosion and Sediment Control

.2 Section 01 74 19 - Construction and Demolition Waste Management

.3 Section 01 81 19 - Indoor Air Quality Requirements

.4 Division 03 – Concrete

.5 Division 04 – Masonry

.6 Division 05 – Metals

.7 Division 06 – Carpentry and Millwork

.8 Division 07 – Thermal and Moisture Protection

.9 Division 08 – Doors and Windows

.10 Division 09 – Finishes

.11 Division 10 – Specialties

.12 Division 12 – Furnishings

.13 Division 22 – Plumbing

.14 Division 23 – HVAC

1.3 Definitions

.1 **Canada Green Building Council (CaGBC):** balanced, consensus based not-for-profit organization whose mission is to lead and accelerate the transformation to high-performing, healthy green buildings, homes and communities throughout Canada.

.2 **CDPH Standard Method v1.2:** California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v. 1.2–2017, for the emissions testing and requirements of products and materials.

.3 **Chain-of-Custody (COC):** A procedure that tracks a product form the point of harvest or extraction to its end use, including all successive stage of processing, transformation, manufacturing, a distribution.

.4 **Chain-of-Custody Certificates:** Certificates signed by manufacturers and fabricators certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001.

.5 **Composite Wood and Agrifibre:** Products made of wood particles and/or plant material pressed and bonded with adhesive or resin such as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.

.6 **Corporate Sustainability Report:** A third-party verified report that outlines the environmental impacts of extraction operations and activities associated with the manufacturer's product and the product's supply chain.

.7 **Environmental Product Declaration (EPD):** An independently verified report based on life-cycle assessment studies that have been conducted according to a set of common rules for each product category and peer-reviewed.

.1 ***Industry-Wide (Generic) EPD***: Provide products with third-party certification (Type III), including external verification, in which the manufacturer is explicitly recognized as a participant by the program operator. EPD must conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope.

.2 ***Product-Specific Declaration:*** A product with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that has at least a cradle to gate scope.

.3 ***Product-Specific Type III EPD:*** A product with a third-party certification, including external verification, in which the manufacturer is explicated recognized by the program operator. EPD must conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope.

.8 **Extended Producer Responsibility (EPR):** Measures undertaken by the maker of a product to accept its own and sometimes other manufacturers' products as postconsumer waste at the end of the products' useful life.

.9 **Extraction Location:** point(s) of origin of the material inputs that are transported to Manufacturing Location to create the product.

.10 **Health Product Declaration Open Standard (HPD):** A standard format for reporting product content and associated health information for building products and materials.

.11 **In-House Process Recycled Content:** percentage by mass of in-house material (i.e. trimmings, cutoffs, and scrap) that is returned to the production process as a part of internal housekeeping.

.12 **LEED® Credit Forms:** online form that supports the required declarations for each of the prerequisites and credits.

.13 **LEED® Credit:** fundamental LEED® criteria that describe practices deemed to reduce the project's environmental, health and resource impacts. Each credit in the LEED® rating system has a defined number of possible points that may be awarded upon successful review of submittal documents demonstrating the credits' requirements were followed.

.14 **LEED® Divisions:** CSI Master Format 2012 Division 3-10, 31, 32 and Division 11, 21-28 as directed by the Contract Administrator.

.15 **LEED® Online:** USGBC's web-based service that employs a series of active PDF forms to allow project teams to fill out credit forms and upload supporting documentation online.

.16 **LEED® Prerequisite:** minimum requirement in a particular LEED® category. Meeting the requirements of a prerequisite does not contribute points to a project's score however all perquisite requirements must be met for a project to be eligible to receive LEED® Canada certification.

.17 **LEED® Total Construction Cost:** cost associated with the LEED® Divisions.

.18 **LEED® Total Materials Cost:** actual materials cost (excluding labor and equipment) from the divisions included for calculating the LEED® Total Construction Cost. Project teams can apply a 45% factor to the LEED® Total Construction Cost (including labor and equipment) to establish a LEED® Total Materials Cost.

.19 **LEED:** Leadership in Energy & Environmental Design is a voluntary, consensus-based, and market-responsive set of criteria that evaluate a project's environmental performance from a whole-building perspective. Successful projects are awarded credits towards LEED® Certification after detailed design and construction documentation, describing the building's performance attributes, are reviewed and accepted by a third party – the Green Building Certification Institute (GBCI)

.20 **Location Valuation Factor:** products and materials that are extracted, manufactured, and purchased within 100 miles (160 kilometers) of the project are valued at 200% of their cost (i.e., the valuation factor is 2) in all cost based Materials and Resources credits.

.21 **Manufacturing Location:** last point of processing or assembly (i.e. a sawmill that turns harvested trees into framing lumber which is then used on-site)

.22 **Permanently Installed Building Product:** An item that arrives on the project site either as a finished element ready for installation or as a component to another item assembled on-site. The product unit is defined by the functional requirement for use in the project; this includes the physical components and services needed to serve the intended function of the permanently installed building product. In addition, similar product within a specification, each contributes as a separate product.

.23 **Post-Consumer Recycled Content:** percentage by mass of recycled material derived from previously used consumer products (i.e. aluminum and steel cans, glass and plastic bottles, asphalt from demolished sites, paper, carpet etc.)

.24 **Pre-Consumer Recycled Content:** percentage by mass of recycled material derived from outside industrial sources (i.e. sawmill dust used in MDF board, blast furnace slag in mineral wool insulation, coal fly ash in concrete mixes etc.)

.25 **Recycled Content:** sum of post-consumer recycled content plus one-half the pre-consumer recycled content, based on cost. Products meeting recycled content criteria are valued at 100% of their cost for the purposes of credit achievement calculation.

.26 **Supplementary Cementitious Materials (SCMs):** materials such as fly ash, ground granulated blast furnace slag, and silica fume) used to reduce the amount of Portland Cement in cementitious materials.

.27 **Total Volatile Organic Compounds (TVOCs):** A range of VOC content, measured as specified in California Department of Public Health (CDPH) Standard Method v1.2-2017, expressed in units of mg/m3.

.28 **U.S. Green Building Council (USGBC):** private, membership-based non-profit organization that promotes sustainability in buildings design, construction, and operation. Best known for its development of the Leadership in Energy and Environmental Design (LEED) green building rating systems.

.29 **Urea-Formaldehyde (UF):** combination of urea and formaldehyde the readily decomposes at room temperature. It is found in some glues/resins used to manufacture furniture, composite woods (e.g. particle board), agrifiber products and laminated assemblies. UF has detrimental effect on human health and may include symptoms such as eye, nose, and throat irritation, wheezing and coughing, fatigue, skin rash and severe allergic reaction.

.30 **Volatile Organic Compounds (VOCs):** organic chemicals that produce vapors readily at room temperature and normal atmospheric pressure (e.g. gasoline, solvents, etc.). VOCs react with sunlight and nitrogen to form ground-level ozone, a chemical that has detrimental effect on human health, agricultural crops, forests, soil, groundwater and ecosystems.

.31 **Weatherproofing System:** a system which protects the building from the exterior environment (wind and water) and is defined as the air barrier within the wall and roof assemblies.

1.4 Acronyms

.1 Used in the LEED® Reference Guide for Building Design and Construction v4 and v4.1, this Section and related Sections identified under Paragraph 1.2 Related Sections.

ACRONYMS	
IP	Integrative Process
LT	Location and Transportation
SS	Sustainable Sites
WE	Water Efficiency
EA	Energy and Atmosphere
MR	Materials and Resources
EQ	Environmental Quality
IN	Innovation
RP	Regional Priority

1.5 References

.1 U.S. Green Building Council. Reference Guide for Building Design and Construction, v4 and v4.1 Beta Guide.

.2 LEED® Online Forms. http://www.usgbc.org/leedonline.new

.3 LEED® Credit Library: LEED® Interpretations, Credit Requirement Summaries, Reference Guide Addenda and Errata. http://www.usgbc.org/credits

.4 USGBC Building Product Disclosure and Optimization Calculator. http://www.usgbc.org/resources/bpdo-calculator

.5 UL Sustainable Product Database: searchable database of building products with various types of documentation that may be suitable for LEED® v4 and v4.1. http://www.ul.com/global/eng/pages/offerings/businesses/environment/databasesearch/

.6 Global Reporting Initiative Sustainability Disclosure Database: searchable database of Corporate Sustainability Reports which may be compliant with LEED® v4 and v4.1. http://database.globalreporting.org/search

.7 Pharos Project: searchable database of Manufacturer Inventories which may be compliant with LEED® v4 and v4.1. https://www.pharosproject.net/

.8 Cradle to Cradle Certified Products Registry: searchable database of C2C Certified products. http://www.c2ccertified.org/products/registry

.9 HPD Collaborative: manufacturer resource for the creation of Health Product Declarations. http://hpdcollaborative.org/

.10 Declare: searchable database of Declare certified products which may be compliant with LEED® v4 and v4.1. https://access.living-future.org/declare-products

.11 Forest Stewardship Council. www.fsc.org.

.12 South Coast Air Quality Management District (SCAQMD) Rules 1168, October 6, 2017 and Rule 1113, February 5, 2016. http://www.aqmd.gov/home/regulations/rules/scaqmd-rule-book/table-of-contents.

.13 California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings.

.14 California Department of Public Health (CDPH) Standard Method v1.2-2017. http://www.cdph.ca.gov/programs/IAQ/Pages/default.aspx

.15 Canadian VOC Concentration Limits for Architectural Coatings. http://ec.gc.ca/lcpe-cepa/eng/regulations/detailReg.cfm?intReg=117

.16 FloorScore Program – Resilient Floor Covering Institute. http://www.rfci.com/knowledge-center/floorscore/

.17 NSF-332 Sustainability Assessment for Resilient Floor Coverings. http://www.nsf.org/services/by-industry/sustainability-environment/sustainability-standards-protocols/floor-coverings/

.18 California Air Resources Board (CARB) ATCM 93120 Formaldehyde Requirements. http://www.arb.ca.gov/toxics/compwood/compwood.htm/

.19 SCS Indoor Advantage Program. http://www.scsglobalservices.com/certified-indoor-air-quality

.20 UL Greenguard Gold Certification Program. http://www.greenguard.org/en/CertificationPrograms/CertificationPrograms_childrenSchools.aspx

.21 ANSI/BIFMA M7.1-2011 (R2016) Standard Test Method for Determining VOC Emissions from Office Furniture Systems, Components and Seating. www.bifma.org

.22 ANSI/BIFMA e3–2014e Furniture Sustainability Standard: bifma.org

.23 Chemical Abstracts Service (CASRN): cas.org/

.24 GreenScreen: cleanproduction.org/Greenscreen.v1-2.php

.25 Health Product Declaration: hpdcollaborative.org/

.26 ISO 16000 parts 3, 6, 7, 11: iso.org

.27 ISO 17025: iso.org

.28 ISO Guide 65: iso.org

.29 Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH): echa.europa.eu/support/guidance-on-reach-and-clp-implementation

1.6 Objectives

.1 Construct a building that uses land, water, energy and material resources appropriately and efficiently and provides a safe, comfortable and productive indoor environment for building occupants in accordance with LEED® requirements.

.2 Be responsible, either in whole or in part, for the following LEED® credits targeted for this Project with regards to coordination, training, verification and execution:

.1 SSp1 Construction Activity Pollution Prevention

.2 EAp1 Fundamental Commissioning and Verification

.3 EAc1 Enhanced Commissioning

.4 MRp2 Construction and Demolition Waste Management Planning

.5 MRc2 Building Product Disclosure and Optimization – Environmental Product Declarations

.6 MRc3 Building Product Disclosure and Optimization – Sourcing of Raw Materials

.7 MRc4 Building Product Disclosure and Optimization – Material Ingredients

.8 MRc6 PBT Source Reduction – Lead, Cadmium, and Copper

.9 MRc5 Construction and Demolition Waste Management

.10 EQc1 Enhanced Indoor Air Quality Strategies

.11 EQc2 Low-Emitting Materials

.12 EQc3 Construction Indoor Air Quality Management Plan

.13 EQc4 Indoor Air Quality Assessment

.3 Source and select materials that meet sustainable criteria detailed herein

.1 No single manufacturer, fabricator, or subcontractor can fulfill the total requirements for LEED® certification for the project. LEED® certification requires the cooperation and diligence of all project participants for a successful application and acceptance for LEED® certification.

.2 Failure to provide products or methods of construction contributing towards LEED® prerequisites will result in the City achieving a Certification less than that specified or none at all. The City reserves the right to seek compensation where failure to achieve Certification is a result of direct neglect or misrepresentation of any material or construction method.

.4 Review and sign off on LEED® Forms for credits listed above using LEED® Online as an accurate indication of construction performance.

1.7 Description Of Work

.1 A LEED® Champion (site superintendent or other individual designated by the Contractor) shall be responsible for coordinating all construction activities associated with LEED® certification.

.2 LEED® coordination activities shall include:

.1 Coordinate with subcontractors and ensuring the successful implementation of LEED® strategies, programs and plans

.2 Report construction activity progress to the Contract Administrator as it relates to the LEED® aspects of the Project

.3 Supply the LEED® documentation and submittals outlined within this specification and related sections to the Contract Administrator to demonstrate that LEED® requirements have been met

.4 Other duties as detailed in the related Sections listed in Paragraph 1.2 Related Sections

.3 The LEED® requirements in this section and the related sections under Paragraph 1.2 Related Sections shall apply to all Sections and Work for this Project, whether specifically indicated or not.

.4 Compliance with requirements needed to obtain LEED® prerequisites and credits will be used as one criterion to evaluate requests for substitutions or alternates.

1.8 LEED® Kick-Off Meeting

.1 Prior to mobilization on-site, the Contractor and the LEED® Coordinator shall hold a kick-off meeting with the Contract Administrator to review the LEED® requirements. This meeting shall include a review of:

.1 LEED® certification and performance objectives

.2 LEED® requirements and procedure

.3 LEED® documentation and submittals

1.9 LEED® Coordination Meeting

.1 Prior to start of construction, the Contractor and the LEED® Coordinator shall hold a coordination meeting with the construction team to explain the LEED® requirements to the Sub-Contractors. This meeting shall include a review of:

.1 LEED® certification and performance objectives

.2 LEED® requirements and procedures

.3 LEED® documentation and submittals

.2 The Contractor shall ensure that the appropriate Sub-Contractors attend this meeting. If Sub-Contractors are unable to attend this meeting, the Contractor shall make arrangements to host additional LEED® Coordination Meetings to suit.

1.10 Submittals

.1 Contractor to provide a LEED® Action Plan a minimum of 14 days prior to the start of construction to the Contract Administrator, a preliminary plan outlining the contribution of each trade to credits listed under Paragraph 1.6.2.

.1 The plan shall be based on projected materials and budgets

.2 The plan shall include the following:

.1 Temporary Erosion and Sediment Control Plan as required in Section 01 57 13

.2 Construction and Demolition Waste Management Plan as required in Section 01 74 19

.3 Indoor Air Quality Management Plan as required in Section 01 81 19

.4 LEED® total construction cost

.5 Material costs based on specification division

.2 Contractor to provide a LEED® Progress Report to the Contract Administrator at the end of each month that includes the following items:

.1 Photographs specified in the sections 01 57 13 and 01 81 19. All photos taken for LEED® documentation purposes shall conform to the following requirements:

.1 Date Stamp: Standard indicating Year, Month and Day

.2 Provide a brief description (a sentence(s) or points) for each photo identifying how LEED® requirements are met

.2 Temporary Erosion and Sediment Control inspection logs/reports as required in Section 01 57 13, conducted on a weekly basis or as directed by the Contract Administrator

.3 Construction Waste Diversion report as required in Section 01 74 19, including the respective Disposal Tickets indicating weight or volume of materials removed from the site.

.4 Indoor Air Quality inspection logs/reports as required in Section 01 81 19, conducted on a bi-weekly basis or as directed by the Contract Administrator

.5 Ongoing completion of LEED® Online Credit Forms assigned by the Contract Administrator for credits listed in Paragraph 1.6.2

.3 Submit **Schedule S1 – Material Information Data Sheet** and supporting documentation (letters from suppliers, MSDSs, product literatures etc.) for all products / materials listed in this Section and as requested by the Contract Administrator

.1 Submit completed schedules and supporting product literature to the Contract Administrator for review at subcontractor contract award

.2 Submit the mass of Portland cement, mass of supplementary cementitious materials (fly ash, slag cement, silica fume, etc.), and the total mass of all cementitious materials used in each concrete mix design.

.1 Submit completed schedules to the Contract Administrator for all concrete mix designs after the Structural Engineer has approved the designs, and prior to delivery of any concrete to the site

.2 A letter signed by the concrete supplier / manufacturer will be accepted that states the total reduction in Portland cement for all concrete used on the project in lieu of submitting mix designs, if the documentation is prepared for each concrete mix (averaging recycled content is not permitted) and identifies the mix recycled content calculated as per the table below.

Mix #	Mass of Portland Cement* (lbs)	Mass of recycled SCMs (lbs)	Mass of total cementitious materials (lbs)	SCMs as a percentage of total cementitious materials (%)	Dollar value of all cementitious materials (from concrete supplier)	Recycled content value per yard [(SCM/2) x dollar value]
2	200	50	250	20%	$35	$3.50
3	300	100	400	25%	$45	$5.63
*This column also includes any other cementitious ingredients that are not recycled.						

.3 The Contractor shall provide vendor invoices, as material is ordered, for all wood-based products (FSC certified or not) purchased by the project contractor and subcontractor.

.1 Each vendor invoice must include the following with the exceptions under 1.10.5.2:

.1 Each wood product must be identified on a line-item basis

.2 FSC products must be identified as such on a line-item basis

.3 The dollar value of each line item must be shown

.4 The vendor's COC certificate number must be shown on any invoice that includes FSC products

.2 In rare instances, it may not be practical for a vendor to invoice wood products on a line-item basis because the invoice would be dozen of pages long. In such cases, the invoice should indicate the aggregate value of wood products sold by the vendor. This compliance path must be approved by the Contract Administrator. If the wood products are FSC certified, comply with the following requirements.

.1 The vendor's COC number must be shown on the invoice

.2 The invoice must be supplemented by a letter from the vendor stating that the products invoiced are FSC certified

.3 The invoice or the letter must state whether the products are FSC Pure, FSC Mixed Credit or FSC Mixed (NN)%

.4 Onsite installers of FSC Certified products must have chain of custody certification if they modify the projects off the project site.

.4 The Contractor will complete all LEED® Online Credit Forms required to document the successful completion of the prerequisites and credits listed under Paragraph 1.4.1.

.5 The Contractor will provide clarification, back-up materials, and remedial works which may be required by the GBCI within 25 business days of their request.

1.11 Penalties

.1 The City reserves the right to withhold Progress Payments pending the submission of documentation or completion of actions required in the Sections listed under Paragraph 1.2 Related Sections

.2 If the Contract Administrator finds the Contractor to be in contradiction of any requirements listed in Sections identified under Paragraph 1.2 and which results in the loss of a LEED® point or credit, the City may withhold enough funds to purchase one LEED® point under credit EAc7 Green Power and Carbon Offsets.

PART 2- PRODUCTS

2.1 Section Overview

.1 Product requirements for attempting LEED® credits under Section 1.6.2.

2.2 Building Product Disclosure and Optimization – Environmental Product Declarations

.1 Use at least 20 different permanently installed products sourced from at least five different manufacturers that meet one of the disclosure criteria below:

.1 **Industry-wide (generic) EPD**. Products with third-party certification (Type III), including external verification, in which the manufacturer is explicitly recognized as a participant by the program operator are valued as one product for purposes of credit achievement calculation.

.2 **Product-specific Type III EPD.** Products with third-party certification (Type III), including external verification in which the manufacturer is explicitly recognized as the participant by the program operator are valued as one and a half products for purposes of credit achievement calculation.

.3 **Product-specific Type III EPD.** Internally Reviewed. Products with an internally critically reviewed LCA in accordance with ISO 14071. Products with product-specific internal EPDs which conform to ISO 14025, and EN 15804 or ISO 21930 and have at least a cradle to gate scope are valued as one whole product for the purposes of credit achievement calculation.

.4 **Life-Cycle Assessment.** Products with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that have at least a cradle to gate scope are valued as one product for the purposes of credit achievement calculation.

.5 **USGBC approved program.** Products that comply with other USGBC approved environmental product declaration frameworks. When published, these will be listed in the LEED® Credit Library (see References section).

.2 At a minimum, the following materials shall meet one of the disclosure criteria as per 2.2.1:

.1 Cast in Place and Precast Concrete

.2 Rebar

.3 Architectural Concrete Masonry Units

.4 Structural Steel

.5 Metal Deck

.6 Corrugated Metal Cladding and Architectural Precast Cladding

.7 Roofing Membranes

.8 Softwood Lumber

.9 Aluminum Extrusions and Aluminum Composite Material

.10 Interior and Exterior Aluminum Framed Glazing Systems

.11 Gypsum Board

.12 Acoustical Ceiling Tiles, Metal Panel Ceilings, and Suspension Systems

.13 Architectural Woodwork

.14 Composite Wood (plywood, MDF, particleboard, doors, etc.)

.15 Flooring (carpets, hard-surfaces, tiles, under pads, etc.)

.16 Wall Base

.17 Solid Surfaces

.18 Metal Doors and Frames

.19 Systems Furniture and Furnishings

.3 Submit supporting documents as per 1.10.3 and 1.10.3.2 for each product or material listed above or used to meet credit MRc2 requirements

2.3 Building Product Disclosure and Optimization—Sourcing of Raw Materials

.1 Use products sourced from at least three different manufacturers that meet at least one of the responsible sourcing and extraction criteria below for at least 20%, by cost, of the total value of permanently installed building products in the project.

.1 **Extended producer responsibility.** Products purchased from a manufacturer (producer) that participates in an extended producer responsibility program or is directly responsible for extended producer responsibility. Products meeting extended producer responsibility criteria are valued at 50% of their cost for the purposes of credit achievement calculation.

.2 **Bio-based materials.** Bio-based products must meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials must be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country. Exclude hide products, such as leather and other animal skin material.

.1 Bio-based products that meet the criteria above: value at 50% of cost multiplied by the biobased content of the product for the purposes of credit achievement calculation.

.2 Bio-based products that meet the Sustainable Agriculture Network's Sustainable Agriculture Standard: value at 100% of cost multiplied by the biobased content of the product for the purposes of credit achievement calculation.

.3 **Wood products.** Select wood-based products / materials that are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria for all wood-based products permanently installed in the project. Products meeting wood products criteria are valued at 100% of their cost for the purposes of credit achievement calculation. Where applicable, the following wood-based material / product shall be FSC certified:

.1 Structural Framing

.2 General Dimensional Framing

.3 Flooring

.4 Sub-Flooring

.5 Wood doors

.6 Finishes

.7 Submit supporting documentation as per 1.10.3 and 1.10.3.3 for each wood-based product / material listed above

.4 **Materials reuse.** Includes salvaged, refurbished, or reused products. Products meeting materials reuse criteria are valued at 200% of their cost for the purposes of credit achievement calculation.

.5 **Recycled content.** Select products / materials that contain recycled content, tracking both pre- and post-consumer recycled content. Products meeting recycled content criteria are valued at 100% of their cost for the purposes of credit achievement calculation. At a minimum, the following materials shall include recycled content:

Material	Min. Post-Consumer (%)	Min. Pre-Consumer (%)	Combined (%)*
Acoustic Ceiling Tile	5	40	25
Asphalt	20	0	20.0
Carpet	5	30	20.0
Ceramic Tile (Floor)	0	30	15
Ceramic Tile (Wall)	0	35	17.5
Composite Wood (MDF, Particle Board)	0	90	45
Composite Wood (MDF, Particle Board)	0	90	45
Concrete (% SCM Content in Cement)	0	25	Varies
Concrete Reinforcement	30	65	62.5
Engineered Fill	25	10	30.0
Fiberglass Insulation	60	0	60
Fiberglass Insulation	60	0	60

Gypsum	5	90	50
Gypsum (Interior)	5	90	50
Light Steel Framing (Steel Studs)	25	5	26
Linoleum	0	35	17.5
Masonry – Light Weight or Acoustic (% slag content in aggregate)	0	80	Varies
Masonry (% SCM Content in Cement)	0	25	Varies
Mineral Wool Insulation	0	40	20
Mineral Wool Insulation	0	40	20
Precast Concrete Products (% SCM Content in Cement)	0	25	Varies
Rubber Flooring	60	5	62.5
Steel Deck, Roofing and Siding	20	25	32.5
Structural Steel	25	40	45
Suspended Ceiling T-Grid (Aluminum)	90	0	90
Suspended Ceiling T-Grid (Steel)	0	25	12.5

.1 *Note: If the minimum Post-Consumer and Pre-Consumer recycled values cannot both be met for a product or material, the combined recycled content value can be used.

.6 **Location Valuation Factor (Regional Material).** Where possible, select products / materials that are extracted, manufactured and purchased locally if they fall within the LEED® Divisions to help achieve MRc2, 3, and 4.

.1 Products / materials are deemed local if they are extracted, manufactured, and purchased within 160km of the project site (straight-line distance). If only a fraction of a product or material is extracted, manufactured, and purchased locally, then only that percentage (by weight) can contribute to the regional value.

.2 Products/materials that are deemed local as above may be valued at 200% of their cost (location valuation factor of 2) for MRc2, 3, and 4 if they also meet at least one sustainability criteria.

.3 The following materials / products are recommended to be of regional content

.1 Landscaping Material

.2 Asphalt

.3 Concrete

.4 Granular Material

.5 Concrete Reinforcement

.6 Masonry

.7 Structural Steel

.8 Steel Deck, Roofing and Siding

.9 Light Steel Framing (Steel Studs)

.10 Fiberglass Insulation

.11 Mineral Wool Insulation

.12 Gypsum

.2 Submit supporting documents as per 1.10.3 and 1.10.3.2 for each product or material listed above or used to meet credit MRc3 requirements

2.4 Building Product Disclosure and Optimization – Material Ingredients

.1 Use at least 20 different permanently installed products from at least five different manufacturers that use any of the following programs to demonstrate the chemical inventory of the product to at least 0.1% (1000 ppm):

.1 **Manufacturer Inventory.** The manufacturer has published a publicly available inventory of all ingredients identified by name and Chemical Abstract Service Registration Number (CASRN) and/or European Community Number (EC Number). Materials defined as trade secret or intellectual property may withhold the name and/or CASRN but must disclose role, amount and hazard score/class using either:

.1 Greenscreen List Translator (LT) score and/or Full GreenScreen Benchmark (BM)

.2 The Globally Harmonized System of Classification and Labeling of Chemicals rev.6 (2015) (GHS). The hazard screen must be applied to each trade secret ingredient and the inventory lists the hazard category for each of the health hazards.

.2 **Health Product Declaration (HPD)**. The end use product has a published, complete Health Product Declaration with full disclosure of known hazards in compliance with the Health Product Declaration open Standard.

.3 **Cradle to Cradle**. Product has Material Health Certificate or is Cradle to Cradle Certified under standard version 3 or later with a Material Health achievement level at the Bronze level or higher.

.4 **Declare Certificate**. Declare labels designated as Red List or Declare. Declare labels designated as LBC Compliant that demonstrate content inventory to 0.1% (1000ppm).

.5 **Product Lens Certification**

.6 **Facts – NSFANSI 336: Sustainability Assessment for Commercial Furnishing Fabric**

.7 **ANSI-BIFMA e3 Furniture Sustainability Standard.** The documentation from the assessor or scorecard from BIFMA must demonstrate the product earned at least 3 points under 7.5.1.3 Advanced Level in e3-2014 or 3 points under 7.4.1.3 Advanced Level in e3-2012.

.2 Use Use at least five different permanently installed products from at least three manufacturers that use any of the following programs to demonstrate material ingredient optimization of the product to at least 0.01% (100 ppm):

.1 **Cradle to Cradle.** Product has Material Health Certificate or is Cradle to Cradle Certified under standard version 3 or later with a Material Health achievement level at the Bronze level or higher.

.2 **Declare Certificate.** Declare labels designated as Red List Free or Living Building Challenge (LBC) Red List Free.

.3 **Living Building Challenge.** Living Building Challenge certified products that include a Red List Free or LBC Red List Free Declare Label.

.4 **REACH Optimization.** Material Inventory to 100 ppm with no substances found on the Authorization List – Annex XIV, the Restriction list – Annex XVII, and the SVHC candidate list.

.5 **Global Green TAG.** PHD Report

.3 Submit supporting documents as per 1.10 for each product or material listed above or used to meet credit MRc4 requirements.

2.5 Interior Adhesives, Sealants, Paints, And Coatings

.1 At least 75% of all adhesives, sealants, paints, and coatings, by volume or surface area, applied on site and within the weatherproofing barrier must be tested and determined compliant in accordance with the California Department of Public Health (CDPH) Standard Method v1.2-2017, EN 16516:2017 or complies with the LCI values from Table 1 of the German AgBB Testing and Evaluation Scheme (2015) and a formaldehyde limit of 10 micrograms per cubic meter or recognized by one of the following equivalent programs:

.1 UL Greenguard Gold

.2 SCS Indoor Advantage Gold

.3 Blue Angel

.4 MAS Certified Green

.5 Berkeley Analytical ClearChem

.6 EMICODE EC1 or EMICODE EC1 Plus

.7 Intertek ETL Environmental VOC+

.8 Eco-INTITUT-Label

.9 Collaborative for High Performance Schools (CHPS)

.2 All wet-applied adhesives, sealants, paints and coatings applied on site and within the weatherproofing membrane must comply with the following criteria:

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD), RULE 1168, 2017		
Product Type	**Reference Standard**	**VOC Limit (g/L)**
ADHESIVES		
Carpet pad adhesives	SCAQMD 1168, 2017	50
Ceramic glass, porcelain and stone tile adhesives	SCAQMD 1168, 2017	65
Cove base adhesives	SCAQMD 1168, 2017	50
Dry wall and panel adhesives	SCAQMD 1168, 2017	50
Multipurpose construction adhesives	SCAQMD 1168, 2017	70
Rubber floor adhesives	SCAQMD 1168, 2017	60
Structural glazing adhesives	SCAQMD 1168, 2017	100
Structural wood member adhesives	SCAQMD 1168, 2017	140
Subfloor adhesives	SCAQMD 1168, 2017	50
VCT and asphalt tile adhesives	SCAQMD 1168, 2017	50
Wood flooring adhesive	SCAQMD 1168, 2017	100
All other indoor floor covering adhesives	SCAQMD 1168, 2017	50
Computer diskette manufacturing adhesive	SCAQMD 1168, 2017	350
Contact adhesive	SCAQMD 1168, 2017	80
Edge glue adhesive	SCAQMD 1168, 2017	250
ABS welding cement	SCAQMD 1168, 2017	325
ABS to PVC transition cement	SCAQMD 1168, 2017	510
CPVC welding cement	SCAQMD 1168, 2017	490
PVC welding cement	SCAQMD 1168, 2017	510
All other plastic welding cements	SCAQMD 1168, 2017	100
Special purpose contact adhesive	SCAQMD 1168, 2017	250
Thin metal laminating Adhesive	SCAQMD 1168, 2017	780
Top and trim adhesive	SCAQMD 1168, 2017	250
Waterproof resorcinal glue	SCAQMD 1168, 2017	170
All other adhesives	SCAQMD 1168, 2017	250
Metal to metal substrate-specific adhesives	SCAQMD 1168, 2017	30
Plastic foam substrate-specific adhesives	SCAQMD 1168, 2017	50
Porous material (except wood) substrate-specific adhesives	SCAQMD 1168, 2017	50
Wood substrate-specific adhesives	SCAQMD 1168, 2017	30
Fiberglass substrate-specific adhesives	SCAQMD 1168, 2017	80
Reinforced plastic composite substrate-specific adhesives	SCAQMD 1168, 2017	200
SEALANTS		
Architectural sealant - Clear, paintable and immediately water-resistant	SCAQMD 1168, 2017	250

Architectural sealant - Foam insulation	SCAQMD 1168, 2017	250
Architectural sealant - Foam sealant	SCAQMD 1168, 2017	250
Architectural sealant - Grout	SCAQMD 1168, 2017	250
Architectural sealant - Non-staining plumbing putty	SCAQMD 1168, 2017	250
Architectural sealant - Potable water sealant	SCAQMD 1168, 2017	250
Architectural sealant - All other architectural sealants	SCAQMD 1168, 2017	50
Marine deck sealant	SCAQMD 1168, 2017	760
Other sealant	SCAQMD 1168, 2017	420
ADHESIVE PRIMERS		
Plastic adhesive primer	SCAQMD 1168, 2017	550
Pressure sensetive adhesive primer	SCAQMD 1168, 2017	250
All other adhesive primers	SCAQMD 1168, 2017	250
SEALANT PRIMERS		
Architectural non-porous sealant primer	SCAQMD 1168, 2017	250
Architectural porous sealant primer	SCAQMD 1168, 2017	775
Marine deck sealant primer	SCAQMD 1168, 2017	760
Modified bituminous sealant primer	SCAQMD 1168, 2017	500
Other sealant primer	SCAQMD 1168, 2017	750

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD), RULE 1113, 2016		
Product Type	**Reference Standard**	**VOC Limit (g/L)**
PAINTS AND COATINGS		
Bond breakers	SCAQMD 1113, 2016	350
Building envelope coating	SCAQMD 1113, 2016	50
Concrete - Curing compounds	SCAQMD 1113, 2016	100
Concrete - Curing compounds for roadways and bridges	SCAQMD 1113, 2016	350
Concrete surface retarder	SCAQMD 1113, 2016	50
Default	SCAQMD 1113, 2016	50
Driveway sealer	SCAQMD 1113, 2016	50
Dry-fog coatings	SCAQMD 1113, 2016	50
Faux finishing coatings - Clear topcoat	SCAQMD 1113, 2016	100
Faux finishing coatings - Decorative coatings	SCAQMD 1113, 2016	350
Faux finishing coatings - Glazes	SCAQMD 1113, 2016	350
Faux finishing coatings - Japan	SCAQMD 1113, 2016	350

Faux finishing coatings - Trowel applied coatings	SCAQMD 1113, 2016	50
Fire-proofing coatings	SCAQMD 1113, 2016	150
Flats	SCAQMD 1113, 2016	50
Floor coatings	SCAQMD 1113, 2016	50
Form release compound	SCAQMD 1113, 2016	100
Graphic arts (sign) coatings	SCAQMD 1113, 2016	200
Industrial maintenance coatings	SCAQMD 1113, 2016	100
Industrial maintenance coatings - Colour Indicating Safety Coatings	SCAQMD 1113, 2016	480
Industrial maintenance coatings - High Temperature IM Coatings	SCAQMD 1113, 2016	420
Industrial maintenance coatings - Non-Sacrificial Anti-Graffiti Coatings	SCAQMD 1113, 2016	100
Industrial maintenance coatings - Zinc-rich IM primers	SCAQMD 1113, 2016	100
Magnesite cement coatings	SCAQMD 1113, 2016	450
Mastic coatings	SCAQMD 1113, 2016	100
Metallic pigmented coatings	SCAQMD 1113, 2016	150
Multi-Color coatings	SCAQMD 1113, 2016	250
Nonflat coatings	SCAQMD 1113, 2016	50
Pre-treatment wash primers	SCAQMD 1113, 2016	420
Primers, sealers, and undercoaters	SCAQMD 1113, 2016	100
Reactive penetrating sealers	SCAQMD 1113, 2016	350
Recycled coatings	SCAQMD 1113, 2016	150
Roof coatings	SCAQMD 1113, 2016	50
Roof coatings, aluminum	SCAQMD 1113, 2016	100
Roof primers, bituminous	SCAQMD 1113, 2016	350
Rust preventative coatings	SCAQMD 1113, 2016	100
Sacrificial anti-graffiti coatings	SCAQMD 1113, 2016	50
Shellac - Clear	SCAQMD 1113, 2016	730
Shellac - Pigmented	SCAQMD 1113, 2016	550
Specialty primers	SCAQMD 1113, 2016	100
Stains	SCAQMD 1113, 2016	100
Stains, interior	SCAQMD 1113, 2016	250
Stone consolidant	SCAQMD 1113, 2016	450
Swimming pool coatings - Repair	SCAQMD 1113, 2016	340
Swimming pool coatings - Other	SCAQMD 1113, 2016	340
Tile and stone sealers	SCAQMD 1113, 2016	100
Traffic coatings	SCAQMD 1113, 2016	100
Tub and tile refinishing coatings	SCAQMD 1113, 2016	420
Waterproofing sealers	SCAQMD 1113, 2016	100
Waterproofing concrete/masonry sealers	SCAQMD 1113, 2016	100

Wood coatings	SCAQMD 1113, 2016	275
Wood coatings - Varnish	SCAQMD 1113, 2016	275
Wood coatings - Sanding Sealers	SCAQMD 1113, 2016	275
Wood coatings - Lacquer	SCAQMD 1113, 2016	275
Wood conditioners	SCAQMD 1113, 2016	100
Wood preservatives - Below-ground	SCAQMD 1113, 2016	350
Wood preservatives - Other	SCAQMD 1113, 2016	350

CALIFORNIA AIR RESOURCES BOARD (CARB) 2007 SUGGESTED CONTROL MEASURE (SCM) FOR ARCHITECTURAL COATINGS		
Product Type	**Reference Standard**	**VOC Limit (g/L)**
Flat coatings	CARB 2007	50
Nonflat coatings	CARB 2007	100
Nonflat - High gloss coatings	CARB 2007	150
Aluminum roof coatings	CARB 2007	400
Basement specialty coatings	CARB 2007	400
Bituminous roof coatings	CARB 2007	50
Bituminous roof primers	CARB 2007	350
Bond breakers	CARB 2007	350
Concrete curing compounds	CARB 2007	350
Concrete/Masonry sealers	CARB 2007	100
Driveway sealers	CARB 2007	50
Dry-fog coatings	CARB 2007	150
Faux finishing coatings	CARB 2007	350
Fire resistive coatings	CARB 2007	350
Floor coatings	CARB 2007	100
Form-release compounds	CARB 2007	250
Graphic arts coatings (sign paints)	CARB 2007	500
High temperature coatings	CARB 2007	420
Industrial maintenance coatings	CARB 2007	250
Low solids coatings	CARB 2007	120
Magnesite cement coatings	CARB 2007	450
Mastic texture coatings	CARB 2007	100
Metallic pigmented coatings	CARB 2007	500
Multi-color coatings	CARB 2007	250
Pre-treatment wash primers	CARB 2007	420
Primers, sealers, and undercoaters	CARB 2007	100
Reactive penetrating sealers	CARB 2007	350
Recycled coatings	CARB 2007	250

Roof coatings	CARB 2007	50
Rust preventative coatings	CARB 2007	250
Shellac - Clear	CARB 2007	730
Shellac - Opaque	CARB 2007	550
Specialty primers, sealers, and undercoaters	CARB 2007	100
Stains	CARB 2007	250
Stone consolidants	CARB 2007	450
Swimming pool coatings	CARB 2007	340
Traffic marking coatings	CARB 2007	100
Tub and tile refinish coatings	CARB 2007	420
Waterproofing membranes	CARB 2007	250
Wood coatings	CARB 2007	275
Wood preservatives	CARB 2007	350
Zinc-rich primers	CARB 2007	340

.3 Submit supporting documentation as per 1.10.3 for each product / material listed above

2.6 Flooring

.1 At least 90% of all flooring products hard and soft surface flooring (carpet, ceramic, vinyl, rubber, engineered, solid wood, laminates), wall base, underlayments, by cost or surface area, within the waterproofing membrane must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.2-2017, or recognized by one of the following equivalent programs:

.1 FloorScore (Resilient Floor Covering Institute) certified for hard flooring

.2 NSF-332 certified for carpet products

.3 CRI Green Label Plus for carpet products

.4 UL Greenguard Gold

.5 SCS Indoor Advantage Gold

.6 Blue Angel

.7 MAS Certified Green

.8 Berkeley Analytical ClearChem

.9 EMICODE EC1 or EMICODE EC1 Plus

.10 Intertek ETL Environmental VOC+

.11 Eco-INTITUT-Label

.12 Collaborative for High Performance Schools (CHPS)

.2 All setting adhesives and grout must meet South Coast Air Quality Management District (SCAQMD) Rule 1168 listed in Paragraph 2.5 above.

.3 Products that are inherently non-emitting sources of VOCs (stone, ceramic, powder-coated metals, plated or anodized metal, glass, concrete, clay brick, and unfinished or untreated solid wood flooring) are considered fully compliant without any VOC emissions testing if they do not include integral organic-based surface coatings, binders, or sealants.

.4 Submit supporting documentation as per 1.10.3 for each product / material listed above.

2.7 Composite Wood

.1 At least 75% of all composite wood, by cost or surface area, shall have low-formaldehyde emissions that meet the Composite Wood Products Regulations (CARB) ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins or contain no added formaldehyde resins. Composite wood and agrifibre products include:

.1 Particleboard

.2 Medium Density Fiberboard (MDF)

.3 Plywood

.4 Wheatboard

.5 Strawboard

.6 Panel substrates

.7 Door Cores

.2 Salvaged and reused architectural millwork more than one year old at the time of occupancy is considered compliant, provided it meets the requirements for any site-applied paints, coatings, adhesives and sealants in Paragraph 2.5 above.

.3 Submit supporting documentation as per Paragraph 1.10.3 for each product / material listed above

2.8 Ceilings, Wall Panels And Insulation

.1 At least 90% of ceilings, 75% of wall panels, and 75% insulation building products must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.2-2017, or recognized by one of the following equivalent programs:

.1 UL Greenguard Gold

.2 SCS Indoor Advantage Gold

.3 Blue Angel

.4 MAS Certified Green

.5 Berkeley Analytical ClearChem

.6 EMICODE EC1 or EMICODE EC1 Plus

.7 Intertek ETL Environmental VOC+

.8 Eco-INTITUT-Label

.9 Collaborative for High Performance Schools (CHPS)

.2 The wall panels product category includes all finish wall treatments (wall coverings, wall paneling, wall tile), surface wall structures such as gypsum or plaster, cubicle/curtain/partition walls, trim, doors, frames, windows, and window treatments. Removable/interchangeable fabric panels, built-in cabinetry, and vertical structural elements are excluded.

.3 The ceilings product category includes all ceiling panels, ceiling tile, surface ceiling structures such as gypsum or plaster, suspended systems (including canopies and clouds), and glazed skylights. Overhead structural elements (exposed, finished, and unfinished) are excluded.

.4 The insulation material category includes all thermal and acoustic boards, batts, rolls, blankets, sound attention fire blankets, foamed-in place, loose-fill, blown, and sprayed insulation. Insulation for HVAC ducts and plumbing piping are excluded.

.5 Products that are inherently non-emitting sources of VOCs (stone, ceramic, powder-coated metals, plated or anodized metal, glass, concrete, clay brick, and unfinished or untreated solid wood flooring) are considered fully compliant without any VOC emissions testing if they do not include integral organic-based surface coatings, binders, or sealants.

.6 Submit supporting documentation as per Paragraph 1.10.3 for each product / material listed above

2.9 Furniture

.1 At least 75% of all furniture in the project scope of work, by cost, must be tested in accordance with ANSI/BIFMA Standard Method M7.1–2011 (R2016). Comply with ANSI/BIFMA e3-2014e Furniture Sustainability Standard, Sections 7.6.2 and 7.6.3, using either the concentration modeling approach or the emissions factor approach. Model the test results using the open plan, private office, or seating scenario in ANSI/BIFMA M7.1, as appropriate, or recognized by one of the following equivalent programs:

.1 UL Greenguard Certified

.2 UL Greenguard Gold

.3 SCS Indoor Advantage - Furniture

.4 SCS Indoor Advantage Gold - Furniture

.5 Intertek ETL Environmental VOC+

.6 MAS Certified Green, following ANSI/BIFMA M7.1-2011

.7 TUVRheinland Green Product Mark Furniture

.2 Salvaged and reused furniture more than one year old at the time of use is considered compliant, provided it meets the requirements for any site-applied paints, coatings, adhesives, and sealants.

.3 Submit supporting documentation as per Paragraph 1.10.3 for each product / material listed above

PART 3 - EXECUTION

3.1 Not Used

END OF SECTION

Schedule S1 Material Information Data Sheet

Complete for all permanently installed products in Divisions 03-10, 31, and 32 as well as 11, 21-28.
Submit to Contract Administrator 14 days prior to ordering product/material.

Contractor Name:		Contractor Contact:	
Manufacturer:		Product Use:	
Product Name:		Material Cost*:	

** cost excluding labour, including overhead and profit. Material cost is required.*

MRc2 Environmental Product Declarations: complete for all materials.

Environmental Product Declaration:	☐ Yes ☐ No	Classification:	☐ Industry-Wide ☐ Product Specific Type III ☐ Life-Cycle Assessment

☐ I have attached a copy of the Environmental Product Declaration

MRc3 Sourcing of Raw Materials: complete for all materials.

Extended Producer Responsibility:	☐ Yes ☐ No	Bio-based Content (%):	
Pre-Consumer Recycled Content (%):		Post-Consumer Recycled Content (%):	
FSC Content (%):		FSC Chain of Custody Number:	

☐ I have attached supporting Manufacturer's documentation confirming all information completed above.
☐ I have attached supporting invoices confirming FSC content, COC number, and cost.

Location Valuation: complete for all materials.

	City	Prov./State	Distance from Project (km)
Extraction Location:			
Manufacturing Location:			
Purchasing Location:			

☐ I have attached supporting Manufacturer's documentation confirming location of extraction, manufacture, and purchase.

MRc4 Material Ingredient Reporting and Optimization: complete for all materials.

Health Product Declaration:	☐ Yes ☐ No	Full Disclosure:	☐ Yes (required) ☐ 1,000 ppm (required)
Cradle to Cradle Certificate:	☐ Yes ☐ No	C2C Level:	☐ v3 Bronze ☐ v3 Silver
Manufacturer Inventory Listing:	☐ Yes ☐ No	Full Disclosure:	☐ Yes (required) ☐ 1,000 ppm (required)
Declare Certificate:	☐ Yes ☐ No	Full Disclosure:	☐ Yes (required) ☐ 1,000 ppm (required)
ANSI/BIFMA e3 Furniture Sustainability Standard	☐ Yes ☐ No	Full Disclosure:	☐ 3+ points earned (required)
Product Lens Certificate	☐ Yes ☐ No		
Facts – NSF/ANSI 336	☐ Yes ☐ No		

☐ I have attached a copy of the Material Ingredient Report

EQc2 Low-Emitting Materials

Adhesives, Sealants, Paints, Coatings, Ceilings, Walls, and Insulation: complete for products applied within the weatherproofing membrane.

Product Classification:	Wet-Applied Products: ☐ Adhesive ☐ Sealant ☐ Paint ☐ Coating	Solid Products: ☐ Ceiling Product ☐ Wall Product ☐ Insulation
General Emissions Evaluation Reported Using:	☐ Emissions Certificate, completed using the California Department of Public Health (CDPH) Standard Method v1.2-2017 ☐ UL Green Guard Gold Certification ☐ SCS Indoor Advantage Gold Certification ☐ Blue Angel Certification ☐ Collaborative for High Performance Schools Certification	☐ MAS Certified Green Certification ☐ Berkeley Analytical ClearChem Certification ☐ EMICODE EC1 or EMICODE EC1 Plus Certification ☐ Intertek ETL Environmental VOC+ Certification ☐ eco-INTITUT-Label Certification ☐ LCI values from Table 1 of the German AgBB Testing and Evaluation Scheme (2015)
For Wet-Applied Products, VOC Content (g/L):		For Wet-Applied Products, Estimated Volume (L):

☐ I have attached supporting Manufacturer's documentation confirming VOC content for wet-applied products.

☐ I have attached a copy of the General Emission Evaluation Report noted above.

Flooring: complete for all flooring products.

General Emissions Evaluation Reported Using:	☐ Emissions Certificate, completed using the CDPH Standard Method v1.2-2017 ☐ UL Green Guard Gold ☐ SCS Indoor Advantage Gold ☐ Blue Angel ☐ Collaborative for High Performance Schools Certification ☐ MAS Certified Green	☐ EMICODE EC1 or EMICODE EC1 Plus ☐ Intertek ETL Environmental VOC+ ☐ FloorScore ☐ Green Label Plus ☐ NSF / ANSI 332 ☐ eco-INTITUT-Label ☐ GUT ☐ Berkeley Analytical ClearChem

☐ I have attached a copy of the General Emission Evaluation Report noted above.

Wood & Composite Wood Products: complete for all composite wood products

Composite Wood Evaluation:	☐ CARB Ultra-Low-Emitting Formaldehyde (ULEF) ☐ Does not contain added formaldehyde (NAF) ☐ CARB Exempt

☐ I have attached a copy of the Composite Wood Evaluation Report noted above.

Furniture and Furnishings: complete for all new furniture and furnishing products.

New Furniture and Furnishings:	☐ ANSI/BIFMA Standard Method M7.1-2011 ☐ UL Greenguard Certified ☐ UL Green Guard Gold ☐ SCS Indoor Advantage - Furniture	☐ SCS Indoor Advantage Gold - Furniture ☐ Intertek ETL Environmental VOC+ ☐ MAS Certified Green ☐ TUVRheinland Green Product Mark Furniture

☐ I have attached a copy of the evaluations report noted above.

PART 1- GENERAL

1.1 Section Includes

.1 Contractor's quality assurance program.

.2 Contractor's field quality control.

.3 Subcontractor Qualification Statements

.4 Independent inspection and testing – City's Quality Assurance.

.5 Inspection and testing schedule.

.6 Reports and documents.

.7 Manufacturer's field review.

.8 Mock-ups.

.9 Mock-up exterior wall and glazing assembly.

1.2 Contractor's Quality Assurance Program

.1 Submit to the City and the Contract Administrator for their information, a quality assurance program (the "Quality Assurance Program").

.2 The Quality Assurance Program shall meet the requirements of Canadian Standards Association CSA CAN3-Z299.3 or such other requirements as set out in the Contract Documents.

.1 The Quality Assurance Program shall be designed so that quality requirements are obtained by progressive implementation of the controls and inspection functions stated in the Quality Assurance Program.

.2 Make any modifications to the Quality Assurance Program as reasonably requested by the City and/or the Contract Administrator.

.3 The Quality Assurance Program shall include, but shall not be limited to, the following:

.1 A system by which changes to the Contract Documents and correspondence with Subcontractor and other correspondence is handled in a controlled manner.

.2 A system for purchased or manufactured materials to be identified, inspected to the specified standard, and covered by a material test report.

.3 A system by which measuring and testing equipment is properly stored, handled, and calibrated to a known standard.

.4 A system by which incoming materials are: inspected to the specified standard; accepted; allocated safe storage; and properly recorded.

.5 A system by which process inspection requirements shall be clearly stated for operations and carried out by qualified personnel.

.6 A system by which final inspections will be carried out and accepted by authorized personnel prior to release for shipping or major assembly.

.7 A system by which non-conformance to requirements of the Contract Documents shall be recorded and solutions proposed by the City or the Contract Administrator are also recorded.

.8 A system by which instructions for handling and storage of equipment shall be given.

.9 A system by which items supplied by City can be inspected and received in a manner which allows replacement or correction.

.10 A system by which a record of quality inspections, tests, and actions shall be kept, including field quality control.

.11 A system by which the City and the Contract Administrator shall be afforded access to manufacturing areas and quality records and issued with copies of pertinent drawings and manufacturing schedules.

.3 Provide the City and the Contract Administrator with regular Quality Assurance Reports for their information according to an agreed schedule.

1.3 Contractor's Field Quality Control

.1 Provide and be responsible for field quality control throughout the Work, including quality control of Subcontractors and major suppliers.

.2 Ensure that the only specified or approved Materials and materials are used.

.3 Provide and maintain an effective quality control program, in accordance with the Quality Assurance Program, and perform inspections and tests to ensure compliance with Contract Documents.

.4 Furnish appropriate facilities, instruments, and testing devices required for performance of the quality control function.

.5 Deliver inspection testing reports or approvals in in accordance with the requirements of Section 01 45 00.

.6 Develop a field quality control manual covering field installation. The form of the manual shall be acceptable to the City and the Contract Administrator. This manual will document field quality control practices of the Contractor, Subcontractors, and major suppliers. The manual shall include, but not be limited to:

.1 Concrete slab moisture and pH testing and surface preparation, including flatness and levelness.

.2 Surface preparation.

.3 Fastener and anchor installation.

.4 Material compatibility testing.

.5 On line fabrication quality control practices.

.6 Shipping.

.7 Field installation.

.8 Field inspection and testing by Contractor.

.9 Field inspection and testing by independent inspection and testing company.

.7 Inspection and testing shall be performed by company qualified to perform the inspections or tests specified or required by the building code, regulations, by-laws, or authorities having jurisdiction.

.8 Retain and pay for inspection and testing that is for Contractor's own quality control or is required by regulatory requirements

.9 Maintain a logbook (copies to be provided to the Contract Administrator at completion of fabrication) documenting date, time, results, and significance of in-plant testing carried out, where applicable, linked to daily production. The form of this logbook shall be acceptable to the City and the Contract Administrator.

1.4 Subcontractor Qualification Statements

.1 Upon request by the Contract Administrator, submit proof of qualifications of Subcontractors to verify Subcontractor's qualifications and experience meet or exceed the requirements of the Contract Documents. The Contractor's Qualification Statement shall include:

.1 Company information: legal structure, financial reference, contract security reference, insurance reference, health and safety, valuation of construction work projected for current year and the actual value for the past four years.

.2 Qualification and experience of personnel: key office and site personnel proposed.

.3 Project experience: A list of five relevant projects for each of the following:

.1 Key construction projects completed in the past five years;

.2 Comparable construction projects completed;

.3 Key construction projects underway.

.2 If, upon review of the Contractor's Qualification Statement, it is found that the Subcontractor does not meet the qualification requirements specified in the Contract Documents pertaining to the parts of the Work for which the Subcontractor has been retained, the Contractor shall replace the unqualified Subcontractor with a qualified Subcontractor, satisfactory to the Contractor and the City, at no additional cost to the City and at no increase in the Contract Time.

1.5 Independent inspection and Testing – City's Quality Assurance

.1 Independent inspection and testing services are used by the City to verify compliance with requirements of the Contract Documents.

.2 Employment of inspection and testing agencies by Contractor or City does not relieve Contractor from responsibility to perform the Work in accordance with Contract Documents.

.1 Independent inspection and testing services do not relieve the Contractor of responsibility for normal shop and site inspection, and quality control of manufacturing and installation.

.2 Specified tests, inspections, and related actions do not limit the Contractor's other quality assurance and control procedures that facilitate compliance with the Contract Documents requirements.

.3 Requirements for the Contractor to provide quality control services required by the Contract Documents, Contract Administrator, City, or authorities having jurisdiction are not limited by City's independent inspection and testing services.

.4 Inspections and tests specified or required that are not specified as independent inspection and testing are the responsibility of the Contractor and are not covered under the City's quality assurance requirements.

.3 The Contract Administrator will, on behalf of City, appoint independent inspection and testing companies, representing, reporting and responsible to the City.

.1 Cost of independent inspection and testing company services will be authorized as a disbursement from Cash Allowance as specified in Section 01 21 00. Independent inspection and testing company shall submit monthly invoice original to Contractor for review, relating invoices to tests and inspection reports. Provide original receipts for disbursements. Invoices for inspection and testing services shall be forwarded by Contractor to Contract Administrator for inclusion in progress payment application.

.4 Additional inspection and testing required because of changes in materials proposed by Contractor or Subcontractors, by lack of proper notice for inspection and testing specified, or required as a result of failure of such materials to meet requirements of the Contract Documents when originally tested, shall be carried out at no additional cost to the City.

.5 Inspection and testing required by codes or ordinances, or by an authority having jurisdiction, and made by a legally constituted authority, shall be the responsibility of the Contractor and shall be paid for by the Contractor, is not part of the City's quality assurance requirements, and shall not be paid by City, unless otherwise specified in the Contract Documents.

.6 Inspection or testing performed exclusively for Contractor's convenience shall be sole responsibility of Contractor, is not part of the City's quality assurance requirements, and shall not be paid by City.

.7 Independent inspection and testing shall be performed by company qualified to perform the inspections or tests specified or required.

.8 Requirements of regulatory companies:

.1 Testing shall be conducted in accordance with requirements of the building code.

.2 Obtain certification where required by the building code and standards.

.9 Cooperation with independent inspection and testing companies:

.1 Provide independent inspection and testing companies with materials and installation information as required and/or requested.

.2 Submit test samples required for testing.

.3 Cooperate with independent inspection and testing companies and give adequate notification of any changes in source of supply, additional work shifts, and other proposed changes.

.4 Provide access to the Work for independent inspection and testing companies wherever the Work is in progress, or wherever Materials, materials, or equipment are stored prior to shipping.

.5 Provide labour, Plant, and temporary facilities required to assist independent inspection and testing companies in sampling and making tests.

.10 Inspection and test specimens:

.1 Inspection and testing will, generally, consist of procedures listed in the following paragraphs, but additional tests may be performed as required to verify conformance to Contract Documents.

.2 Specimens and samples for testing, unless otherwise specified in the Contract Documents, shall be taken by the independent inspection and testing company; sampling equipment and personnel shall be provided by the independent inspection and testing company; and deliveries of specimens and samples to the testing company shall be performed by the testing company unless otherwise specified.

.3 Independent inspection and testing company shall take samples necessary to verify quality as specified. Taking of samples shall not endanger the structure or life safety, and shall be taken so as to best represent the Work as a whole.

.4 Samples shall be handled, packaged, stored and delivered in accordance with specified tests. Sample handling where required shall duplicate conditions at the Site (such as site-cured concrete cylinders).

.11 Where evidence exists that defective workmanship may have occurred, or that the Work may have been carried out incorporating defective materials, or where tests demonstrate that installed conditions do not comply with the requirements of the Contract Documents, the Contract Administrator reserves the right to have additional inspections, tests, analysis, and surveys performed in order to help determine the extent of defect and whether such work must be replaced. Inspections, tests, and surveys carried out under these circumstances will be made at the Contractor's expense, and will not be paid by City, unless the results indicate that the work so tested, inspected or surveyed is not defective or that, in Contract Administrator's opinion, the work so tested, inspected, or surveyed may be accepted, in which case tests, inspections or surveys will be paid by City.

.12 Repair work damaged as a result of independent inspection and testing work.

1.6 Inspection and Testing Schedule

.1 Prepare schedule for inspection and testing company services in accordance with Section 01 32 00 and as follows:

.1 Establishing schedule:

.1 By advance discussion with the selected independent inspection or testing company, determine the appropriate time necessary to perform the required services and to issue related reports.

.2 Allow for required time within construction schedule.

.2 Adherence to schedule:

.1 Contractor shall advise independent inspection and testing companies in advance when inspection and testing of the Work is required.

.1 Amount of advance notice shall be as required by the independent inspection and testing company, but shall be no less than 2 Working Days.

.2 When independent inspection and testing company is ready to perform inspection and testing according to predetermined schedule, but is prevented from inspection and testing or taking specimens due to incompleteness of the parts of the Work scheduled for inspection and testing, extra costs for inspection and testing attributable to the delay shall be at the Contractor's expense and at no additional cost to the City.

.3 Notify independent inspection and testing company at least 3 Working Days before work required to be inspected commences, and arrange for a meeting at the Site, to be held 1 Working Day before the work starts with the following present:

.1 The Contractor, and the Subcontractor responsible for the work to inspected and/or tested, the inspection and testing company representatives, the product manufacturer's representative when required, and the Contract Administrator.

.4 For inspection and testing required by Contract Documents or by authorities having jurisdiction, provide Contract Administrator and inspection and testing agencies with timely notification in advance of required inspection and testing.

.5 Give 2 Working Days' prior notice to independent inspection and testing company of the commencement of each phase of the Work requiring inspection, and provide independent inspection and testing company with materials and installation information.

1.7 Reports and Documents

.1 Inspection and testing company, whether for City's quality assurance or for Contractor's quality assurance, shall submit shop inspection and site inspection reports within 5 Working Days of each inspection.

.2 Distribute reports digitally as follows:

.1 City.

.2 Contract Administrator.

.3 Contractor.

.4 Consulting engineers, as applicable.

.3 Inspection and testing companies, whether for City's quality assurance or for Contractor's quality assurance, shall submit a written report for each inspection or test, including pertinent data such as conditions at the Site, dates, test references, locations of tested materials, actual Material identification, testing methodology, procedures, and descriptions, site instructions given, recommendations and/or any other information required by standard applicable to reporting of tests and inspections.

.1 Report shall clearly indicate failure of Material or procedures to meet applicable standards, give recommendations for retesting or correction. Inspector shall contact Contractor and Contract Administrator immediately when Material or assembly fails to meet requirements of the Contract Documents.

.4 Upon completion of portions of the Work subject to inspection and testing, whether for City's quality assurance or for Contractor's quality assurance, submit to the Contract Administrator duplicate certificates of acceptance of the installation issued by the inspection and testing company.

1.8 Manufacturer's Field Review

.1 Where manufacturer's field review is specified, manufacturer's representative shall review the relevant parts of the Work at the Site, or wherever such affected work is in progress, to verify that the relevant parts of the Work are being executed in accordance with manufacturer's written requirements and verify their product is fit for the purpose intended.

.2 Manufacturer's field review is to verify that the Materials specified are being used in the Work and are being applied on surfaces prepared in accordance with manufacturer's written requirements and the requirements of the Contract Documents.

.3 Unless otherwise indicated, manufacturer's representative shall undertake a minimum of 3 field reviews, with additional reviews as required by the manufacturer, to verify that the relevant parts of the Work are in accordance with the manufacturer's written requirements.

.4 Manufacturer's representative shall submit a type-written report on manufacturer's letterhead after each field review following procedures for reports and documents specified in Section 01 45 00. Report shall document manufacturer's representative's field observations and recommendations.

1.9 Mock-Ups

.1 Provide field or shop erected example of work complete with specified materials and workmanship.

.2 Provide field or shop erected mock-ups of Work as noted. If a mock-up location is not indicated in the Drawings or Specifications, locate where directed by Contract Administrator.

.3 Provide exterior envelope mock-ups in accordance with Sections 07 08 00 and 08 08 00.

.4 Do not proceed with work for which mock-ups are required prior to Contract Administrator's review of mock-ups.

.5 Modify mock-up as required until Contract Administrator written acceptance is obtained.

.6 Protect and maintain mock-ups until directed to be removed.

.7 Commence work demonstrated in mock-up only after review and acceptance of workmanship.

.8 Remove mock-ups only when the Work they represent is complete or when otherwise directed by Contract Administrator.

.9 Mock-ups may not become part of finished work, except with explicit, prior, written acceptance of Contract Administrator.

.10 Reviewed and accepted mock-ups shall be the standard of workmanship and material against which installed work will be compared.

.11 Remove and replace Materials or assemblies appearing in the finished work that do not match reviewed and accepted mock-ups.

1.10 Mock-up – Exterior Wall and Glazing Assembly

.1 Contractor shall provide complete in-situ mock-up wall assemblies, in locations designated by the Contract Administrator, for each of the wall and glazing assemblies indicated, prior to the commencement of fabrication and installation of related components or assemblies:

.1 The mock-up shall include materials required to complete wall assembly and demonstrate materials, terminations and transitions in wall and glazing assembly systems, including the following components, as applicable:

.1 Masonry.

.2 Metal cladding systems.

.3 Aluminum composite panel cladding.

.4 Architectural precast concrete.

.5 All glazing types.

.2 Erect and dismantle mock-up assembly as many times as required to achieve requirements of Contract Documents.

.3 Dismantle and dispose of accepted mock-up, when directed by Contract Administrator, in writing.

.4 Mock-up may not become part of finished work, except with explicit, prior, written acceptance of Contract Administrator.

PART 2 - PRODUCTS
Not applicable.

PART 3 - EXECUTION
Not applicable.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Temporary utilities - general.

.2 Temporary electrical services.

.3 Temporary water supply.

.4 Temporary heating and ventilation.

1.2 Temporary Utilities - General

.1 Provide temporary utilities as specified and as otherwise necessary to perform the Work expeditiously.

.2 Arrange and pay for required temporary services, unless otherwise specified.

.3 Provide connection and disconnection of temporary services and facilities required in the Work.

.4 Remove temporary utilities after use.

.5 Existing services:

.1 Protect and maintain without interruption, existing water, heating, drainage, and other services within the Site to existing buildings not within the scope of the Work of this Contract. Obtain written permission of the City for services required to be temporarily shut off, at least 2 full Working Days in advance.

.2 Do not use permanent mechanical, or electrical systems during the course of the Work unless specific written permission is provided by the Contract Administrator. Use of permanent services for temporary construction service shall not prejudice warranties.

1.3 Temporary Electrical Services

.1 Provide, pay for, and maintain an adequate temporary electrical service for performance of the Work including, but not limited to, operation of electric pumps, motors, vibrators and other power tools, hoisting and related construction and general illumination during the Work.

.1 Do not use new building power systems during construction without prior written authorization from Contract Administrator and City.

.2 Provide and maintain any components and equipment necessary to transform supply power to necessary temporary power voltage.

1.4 Temporary Water Supply

.1 Provide, pay for, and maintain a temporary supply of water for use in the Work.

1.5 Temporary Heating and Ventilation

.1 Provide and pay for temporary heating, cooling and ventilating required for the Work, including attendance, maintenance and fuel.

.2 Provide temporary heat and ventilation as required to:

.1 Facilitate continuous uninterrupted progress of the Work.

.2 Protect the Work and Materials against damage and defacement caused by weather, harmful levels of temperature, humidity, and moisture.

.3 Protect the Work against dampness and cold.

.4 Prevent moisture condensation on surfaces, freezing, or other damage to finishes or stored Materials.

.5 Provide ambient temperatures and humidity levels for proper storage, installation and curing of materials, in accordance with specified standards and manufacturer's requirements.

.6 Provide adequate ventilation to meet health regulations for safe working environment.

.3 Prior to enclosing building, maintain work areas at not less than 7°C. After enclosing, keep premises heated to at least 13°C using temporary heating devices that do not cause moisture and humidity build-up within the facility. Increase temperatures in isolated areas to 20°C as required by various sections of the Specifications or by Material manufacturers.

.4 Provide temporary heat or adequate protection by means of straw or other coverings to floor slabs, footings, or any part of building not specifically designed to withstand frost penetration.

.5 Furnish other temporary heating as required by various sections of the Specifications or by Material manufacturers.

.6 Ventilate to the exterior of the building work areas as required when toxic materials are being utilized or cured.

.7 Replace with new, any work damaged due to failure to provide adequate heat at no cost to City.

PART 2 - PRODUCTS
Not applicable.

PART 3 – EXECUTION
Not applicable.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 General scope and responsibility.

.2 Parking.

.3 Temporary sanitary facilities.

.4 Temporary site office.

.5 Temporary telephone and Wi-Fi.

.6 Fire protection.

.7 Temporary site storage.

.8 Traffic control and road maintenance.

.9 Signs and notices.

1.2 General Scope and Responsibility

.1 Refer to 63-2025B Tender document for additional information.

.2 Arrange, obtain and pay cost for permits required for temporary facilities and controls.

.3 Provide and maintain temporary facilities for the Work and remove them from the Work upon issuance of certificate of Substantial Performance.

.4 Do not use permanent facilities during the course of the Work unless specific written permission is provided by the Contract Administrator. Where use of permanent facilities is granted for temporary construction service, such use of permanent facilities shall not prejudice warranties.

1.3 Construction Parking

.1 Parking for workers will be permitted at the Site.

.1 Contractor to provide and maintain adequate access to the Site.

.2 Do not interfere with the operation of existing premises. Keep existing parking areas and road system remain free and clear of obstructions resulting from the Work.

.3 Illegally parked vehicles that are ticketed and/or towed shall be the sole responsibility of the vehicle owner.

1.4 Temporary Sanitary Facilities

.1 Provide and maintain temporary sanitary facilities for use by workers, including separate, stand-alone, dedicated washrooms for women only. The use of existing building's sanitary facilities by workers shall be prohibited.

.2 Use of new sanitary facilities by workers is prohibited.

.3 Contractor to ensure temporary sanitary facilities are maintained throughout the full project schedule.

1.5 Temporary Site Offices

.1 Provide heated, lighted, air conditioned and ventilated site office, of sufficient size to accommodate site meetings for 12 people, and furnished with drawing layout table, filing cabinets, telephone, and Wi-Fi as described below.

1.6 Temporary Telephone and Wi-Fi

.1 Provide and maintain a telephone in temporary site office for exclusive use of Contract Administrator, Contractor, and Subcontractors. Pay phone is not acceptable.

.2 Superintendent shall be equipped with mobile telephone device.

.3 Long distance charges shall be paid by party making call.

.4 Provide and maintain internet access for the Contract Administrator and other guests through a high bandwidth WiFi hub capable of supporting traffic with 50 connected devices simultaneously.

1.7 Fire Protection

.1 Provide and maintain temporary fire protection systems and equipment during construction.

1.8 Temporary Site Storage

.1 Handle and store Materials to prevent damage or defacement to the Work and surrounding property.

.2 Construct weather-tight storage sheds for storage of materials that may be damaged or defaced by weather. Provide floors raised 150 mm (6”) clear of ground for storage of Materials.

.3 City is not responsible for securing Materials or materials at the Site.

1.9 Traffic Control and Road Maintenance

.1 Provide and maintain adequate access to Site.

.2 Do not block roads or impede traffic. Keep construction traffic to designated roads only. Provide flagperson to direct traffic as required.

.3 Provide regulatory signs and traffic control in accordance with Specifications E7.

.4 Provide a hard surface area at the Site for cleaning down trucks prior to entry onto municipal roads or private roads outside of the Site.

.5 Keep public and private roads free of dust, mud and debris resulting from truck, machinery and vehicular traffic related specifically to this project, for the duration of Work.

.6 Clean roads regularly, public or private. Wash down and scrape flush roads at least daily when earth moving operations take place. Maintain public property in accordance with requirements of authorities having jurisdiction.

.7 Vehicle cleaning:

.1 Establish a designated vehicle loading point at the Site on a gravel base to minimize tracking of soil off the Site. If the loading point becomes contaminated, it shall be cleaned and replaced.

.2 Vehicles leaving the Site shall be cleaned of loose soil and dust, including tire washing, and sweeping or washing of exteriors and tailgates by a designated labourer.

.3 Keep a daily log of each vehicle leaving the Site, including time of cleaning and name of cleaner.

.4 Tarp vehicles containing indigenous soil or debris leaving the Site.

1.10 Signs and Notices

.1 Project sign:

.1 Design and erect a 1220 x 2440 mm (4' x 8') free standing project sign including backing posts, post foundations, framing and installation.

.2 Project sign shall be UV ink printed to 12.7 mm (1/2”) thick MDD (Medium Density Overlay) outdoor rated plywood.

.3 Sign shall contain project name, rendering, and information regarding the City, Contract Administrator, Contractor and other information as required.

.4 Sign shall be professionally finished according to the design provided by Contract Administrator.

.5 Location of sign: In prominent location to Contract Administrator acceptance.

.2 Contract Administrator signs:

.1 Install at the Site corporate signs as provided by Contract Administrator.

.2 Location of sign: In prominent location to Contract Administrator’s acceptance.

.3 Mount sign on suitable supports.

.3 No other signs or advertisements, other than safety, warning, or directional signs, are permitted without Contract Administrator’s prior approval.

PART 2 - PRODUCTS

Not applicable.

PART 3 – EXECUTION

Not applicable.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 General scope and responsibility.

.2 Temporary enclosures and protection.

.3 Protection of the public.

.4 Protection of the Work.

.5 Protection of foundations.

.6 Protection of concrete floors to remain exposed in finished work.

1.2 General Scope and Responsibility

.1 Provide and maintain signs, guard-rails, barriers, warning lights and other protection as required by authorities having jurisdiction for safety of the Site. Be responsible for adequacy of protection.

.2 Plant, Machinery and Scaffolding:

.1 Provide formwork, scaffolding, equipment, tools, machinery and incidental appurtenances necessary for the proper execution of the Work.

.2 Erect plant, machinery and scaffolding to permit access to building and the Work.

.3 Use scaffolds in such manner as to interfere as little as possible with other trades' operations.

.4 Support scaffolds from finished surfaces only after taking precautions to prevent damage. No supports, clips, brackets, or similar devices shall be welded, bolted, or otherwise affixed to any finished member or surface without prior permission.

.3 Maintain temporary barriers and enclosures in good condition for the duration of the Work.

.4 Remove temporary barriers and enclosures from Site when no longer required.

1.3 Temporary Enclosures and Protection

.1 Provide temporary weather-tight enclosures and protection for exterior openings in building as soon as walls, floors and roofs are built so as to protect the Work from weather and vandalism. Provide doors in enclosures as necessary to maintain fire exits.

.2 Erect, maintain, and relocate enclosures as required to facilitate construction operations and City’s operational requirements.

.3 Temporary enclosure and protection shall be of finished appearance and painted to colour approved by City.

1.4 Protection of the Public

.1 Provide fencing, barricades, hoarding, notices and warning boards and maintain lights and signals for protection of workers engaged on the Work, for protection of adjoining property and for protection of the public.

.2 Where any special hazard exists from which it is not possible to protect the public safety by other means, watchpersons shall be employed to preserve public safety until the area of special hazard no longer poses a risk to public safety.

1.5 Fire Routes

.1 Maintain fire access routes, including overhead clearances, for use by emergency response vehicles.

1.6 Protection of the Work

.1 Protect the Work from damage, discolouring, and defacement. Maintain protection until the Work is complete.

.2 Have damaged or defaced work corrected by workers meeting qualification requirements of the Contract Documents.

.3 Provide minimum 3 mm thick Masonite board protection, or finish flooring manufacturer approved alternative, to all finished floors.

.4 Contractor shall provide the Contract Administrator a minimum of 15 Working Days prior written notice of the intent to drive vehicles or heavy equipment over finished floors or floor slabs and submit supporting data. Any shoring or other supplementary support required shall be provided by the Contractor at no increase in the Contract Price and at no additional cost to the City.

.5 Provide plywood protection to precast stair treads, until Substantial Performance.

1.7 Protection of Foundations

.1 In cold and freezing weather, prevent heaving of foundations due to freezing action of ground.

1.8 Protection of Concrete Floors to Remain Exposed in Finished Work

.1 Non-marking protection material shall be placed over concrete floors designated as exposed.

.2 Post the following on warning signs at locations leading to areas of where concrete floors are to remain exposed in finished work (see Concrete Floor Contractors Association of Canada):

.1 Concrete floors shall be protected from staining, damage and excessive loading at all times:

.1 No traffic is permitted on new concrete floors for the first 3 days after placement.

.2 Foot traffic is permitted between 3-7 days after placement (curing materials must be replaced where disturbed by traffic).

.3 Scissorlifts and light equipment are permitted 7 days after slab placement.

.4 Vehicles shall be diapered to prevent oil and other liquid spills (remove leaking equipment from the jobsite immediately).

.5 Tires shall be non-marking or taped with non-marking tape to prevent marking of the floors.

.6 Trucks, forklifts and any other heavy loads may only to be placed on the floor if they have been previously approved by the Contract Administrator.

.7 Spills must shall be cleaned up immediately to avoid permanent staining of the concrete.

.8 Concrete shall be protected from scratching and impact damage at all times. No cutting, painting, welding or other injurious activities shall be performed without protecting the concrete from damage prior to the commencement of work.

PART 2 - PRODUCTS
Not applicable.

PART 3 – EXECUTION
Not applicable.

END OF SECTION

PART 1- GENERAL

1.1 Section Includes

.1 General scope and responsibility.

.2 Plant Protection.

.3 Security.

.4 Pest control.

.5 Dust, debris and noise control.

.6 Temporary drainage and dewatering.

.7 Snow removal.

.8 Pollution control.

1.2 General Scope and Responsibility

.1 Arrange, obtain and pay cost for permits required for temporary controls.

.2 Provide temporary controls as necessary for performance of the Work and in compliance with applicable regulatory requirements.

.3 Maintain temporary controls in good condition for the duration of the Work.

.4 Remove temporary controls and Plant used to provide temporary controls from Site when no longer required.

1.3 Plant Protection

.1 Protect trees and other plant material designated to remain on site where indicated. Protect roots from disturbance or damage during excavation and grading. Avoid traffic, dumping and storage of materials over root zones.

.2 Minimize stripping of topsoil and vegetation.

1.4 Security

.1 The Contractor shall be solely responsible for securing the Site and the Work, and for securing areas used for the storage of Materials or construction machinery and equipment. The City shall have no responsibility in this regard.

.1 Provide and maintain security lighting.

.2 Provide and maintain temporary locks. Premises to be locked after working hours.

.2 Provide 24-hour video monitoring of the Site, to the approval of the Contract Administrator.

1.5 Pest Control

.1 Provide rodent control and other pest control programs during the Work in accordance with the requirements of authorities having jurisdiction.

1.6 Dust, Debris and Noise Control

.1 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

.2 Control dust and dirt produced during the Work to prevent dispersion beyond the immediate work areas.

.3 Prevent materials from contaminating air beyond application area, by providing temporary enclosures and ventilation/filtration.

.4 Implement and maintain dust and particulate control measures in accordance with applicable regulatory requirements.

.5 Execute Work by methods that minimize dust from construction operations and spreading of dust on site or to adjacent properties.

.6 Provide temporary enclosures to prevent extraneous materials resulting from sandblasting or similar operations from contaminating air beyond immediate work area.

.7 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

.8 Use appropriate covers on trucks hauling fine, dusty, or loose materials.

.9 Limit noise levels in accordance with requirements of authorities having jurisdiction and the City.

.10 Prevent abrasive-blasting, pressure-washing spray, and other extraneous materials from contaminating air beyond application area.

1.7 Temporary Drainage and Dewatering

.1 The Work includes the removal of collected groundwater and surface water accumulating from precipitation and groundwater infiltration throughout the course of the Work until date of Substantial Performance.

.2 Provide temporary drainage and pumping as necessary to dewater excavations, trenches, foundations, and other parts of the Work. Maintain such areas free of water arising from groundwater or surface run-off, as required to keep them stable, dry, and protected from damage due to flooding.

.3 Maintain standby equipment necessary to ensure continuous operation of dewatering system.

.4 Do not pump water containing suspended materials or other harmful substances into waterways, sewers or surface drainage systems. Treat or dispose of such water in accordance with applicable regulatory requirements

.5 Keep drainage lines and gutters open. No flow of water shall be directed across or over pavements except through pipes or properly constructed troughs. Keep portions of the Work properly and efficiently drained during construction and until completion. Be responsible for disturbances, dirt and damage which may be caused by or result from water backing up or flowing over, through, from or along any part of the Work, or due to operations which may cause water to flow elsewhere.

.6 Keep trenches and other excavations free of water. Remove water in a manner that will prevent loss of soil, and maintain the stability of existing soils.

.7 Dispose of such water in a manner that will not be hazardous to public health and safety, private property, or to the Work.

.8 Drainage of trenches or other excavation through storm drainage pipe will be allowed only with the express permission of the authority having jurisdiction.

.9 When drainage is permitted in writing to be directed to existing catch basins, regularly and at Substantial Performance inspect such catch basins and remove accumulated debris and sediment.

.10 Maintain grades to ensure proper site drainage.

.11 Prevent precipitation from infiltrating or from directly running off stockpiled materials. Cover stockpiled materials with an impermeable liner during periods of work stoppage including at end of each Working Day.

.12 Control surface drainage from cuts and fills, from borrow and waste disposal areas, from stockpiles, staging areas, and other work areas as required to prevent erosion and sedimentation.

.13 Control surface drainage by ensuring that gutters are kept open and water is not directed across or over pavements or sidewalks, except through pipes or properly constructed troughs. Ensure that runoff from unfinished areas is intercepted and diverted to suitable outlets.

1.8 Snow Removal

.1 Allow no accumulation of ice and snow within the Site. There shall be no use of salt for de-icing in areas of building work.

.2 Clear snow and ice from public sidewalks as required to comply with applicable municipal regulatory requirements.

1.9 Pollution Control

.1 Prevent contamination of soil, water, and atmosphere through uncontrolled discharge of noxious or toxic substances and other pollutants, potentially causing environmental damage.

.2 Be prepared, by maintaining appropriate materials, equipment, and trained personnel on site, to intercept, clean up, and dispose of spills or releases that may occur. Promptly report spills and releases that may occur to:

.1 Authority having jurisdiction.

.2 Person causing or having control of pollution source, if known.

.3 City and Contract Administrator.

.4 Take immediate action to contain and mitigate harmful effects of the spill or release.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

Not applicable.

END OF SECTION

PART 1 - GENERAL

1.1 Section Overview

.1 Work in this Section includes, but is not limited to, requirements for erosion and sedimentation controls during construction, which forms the Contractor's commitment for LEED® Construction Activity Pollution Prevention Prerequisite as follows:

.1 Contractor's responsibilities for development and implementation of an Erosion and Sedimentation Control Plan

.2 Contractor's responsibilities to confirm compliance with requirements of the Erosion and Sedimentation Control Plan.

.2 This Section includes guidelines and recommendations for developing an Erosion and Sedimentation Control Plan; failure to implement the Contractor's responsibility for the Erosion and Sedimentation Control Plan has the potential to nullify LEED® Sustainable Sites Construction Activity Pollution Prevention Prerequisite resulting in the City receiving no LEED® Certification.

1.2 Related Sections

.1 01 33 29 General LEED® Requirements

1.3 References

.1 **U.S Green Building Council: Sustainable Sites Construction Activity Pollution Prevention Prerequisite.** LEED® Reference Guide for Building Design and Construction v4 http://www.cagbc.org

.2 **Environmental Protection Agency (EPA) Construction General Permit (CGP) 2012:** cfpub.epa.gov/npdes/stormwater/cgp.cfm

1.4 Objectives

.1 Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.

.2 Prevent sedimentation of storm sewer or receiving streams.

.3 Prevent pollution of the air with dust and particulate matter.

.4 Meet or exceed the requirements of LEED BD+C Sustainable Sites Construction Activity Pollution Prevention Prerequisite which requires compliance with 2012 U.S. EPA Construction General Permit OR local standards and codes, whichever is more stringent.

1.5 Description Of Work

.1 A LEED Coordinator (site superintendent or other individual designated by the Contractor) shall be responsible for coordinating all aspects of LEED coordination (during construction) related to erosion and sedimentation control

.2 Assess which ESC measures are needed based on a site evaluation that identifies the following:

.1 The slope of the project site and where water will drain

.2 The total area and duration of ground disturbance to identify air quality and rainwater runoff effects on neighboring properties

.3 The location of existing rainwater management systems that must be protected

.4 Planned construction sequencing that may require additional ESC measures over time

.5 Weather and soil conditions that could cause rainwater runoff or generate dust

.6 Construction entrances and their erosion and sedimentation effects on local roads servicing the project site

.3 Erosion and Sedimentation Control activities shall include:

.1 Implementing erosion and sedimentation control measures shown on drawings and described in this Section

.2 Installing erosion and sedimentation control products in accordance with manufacturer instructions and the prescribed installation procedures in the referenced EPA document

.3 Supervising on site erosion and sedimentation control activities on a daily basis

.4 Coordinating erosion and sedimentation control tasks with subcontractors to ensure timely and orderly progress of the work

.5 Conducting erosion and sedimentation control inspections and making necessary repairs

.6 Maintaining an erosion and sedimentation control inspection log to document observations, deficiencies and corrective actions

.7 Preparing erosion and sedimentation control documentation and submittals as detailed herein

.8 Reporting erosion and sedimentation control progress to the Contract Administrator

1.6 Submittals

.1 Submit an Erosion and Sedimentation Control Plan to the Contract Administrator for approval a minimum of 14 days prior to construction, the plan shall include all the requirements outlined in the Environmental Protection Agency (EPA) Construction General Permit (CGP) 2012 Section 2:

.1 Section 2.1, erosion and sedimentation control

.1 Providing natural buffers

.2 Installing perimeter controls

.3 Minimizing sediment track-out

.4 Controlling discharges from stockpiled sediment or soil

.5 Minimizing dust

.6 Minimizing the disturbance of steep slopes

.7 Preserving topsoil

.8 Minimizing soil compaction

.9 Protecting storm drain inlets

.10 Maintaining control measures

.2 Section 2.2, stabilization

.1 Deadlines for initiating and completing stabilization

.2 Criteria for stabilization

.3 Section 2.3, pollution prevention

.1 Prohibited discharges

.2 General maintenance requirements

.3 Pollution prevention standards

.4 Emergency spill notification

.5 Fertilizer discharge restrictions

.2 Identify whether ESC plan is in compliance with EPA standards or local codes. If local codes are used, submit a description on how they are more stringent than EPA standards.

.3 Identify measures to be implemented on site for the following:

.1 Site Arrangement

.2 Stabilized Construction Entrance

.3 Material Stockpiling

.4 Stabilization Practices (i.e. seeding, mulching, etc.)

.5 Structural Practices (i.e. silt fence, outlet protection, sediment trap etc.)

.4 Submit product data indicating actual materials used for erosion and storm water controls

.5 Inspections should follow the requirements the CGP, section 4.1.

.6 Submit Schedule **E1 – ESC Inspection Log**

.1 Complete the ESC Inspection log on a weekly basis. The log shall commence when the site is “disturbed” (i.e. when site work begins) and carry through until final landscaping is complete

.2 The ESC Inspection log shall be completed for each inspection and must document:

.1 Deficiencies related to the ESC measures

.2 Corrective actions taken to remedy the deficiencies

.7 Each deficiency must be initialed and each report signed after all corrective measures have been completed and documented

.8 All ESC Inspection Log shall include digital photographs showing:

.1 A minimum of 2 photographs of each ESC measure implemented on site

.2 Date Stamp: Standard indicating Year, Month and Day

.3 Identify what ESC measure is shown in each photo

.9 Submit an up-to-date copy of the ESC Inspection Report comprising the Schedule E1 and photographs to the Contract Administrator on a monthly basis

PART 2 - PRODUCTS

2.1 Not Used

PART 3 - EXECUTION

3.1 Erosion and Sedimentation Control

.1 Establish control measures before construction begins, according to requirements in CGP Section 2.1. Implement additional measures as needed based on site conditions and as construction progresses.

3.2 Stabilization Requirements

.1 Stabilize exposed portions of the site, according to requirements in CGP Section 2.2. Implement additional measures as needed based on site conditions and as construction progresses.

3.3 Pollution Prevention

.1 Establish control measures before construction begins, according to requirements in CGP Section 2.3. Implement additional measures as needed based on site conditions and as construction progresses.

.2 The following discharges are prohibited:

.1 Wastewater from washout of concrete, unless managed by an appropriate control as described in CGP, Part 2.3.3.4

.2 Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials, unless managed by an appropriate control as described in CGP, Part 2.3.3.4

.3 Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance;

.4 Soaps, solvents, or detergents used in vehicle and equipment washing

.5 Toxic or hazardous substances from a spill or other release.

3.4 Best Management Practices (BMPs)

.1 Vehicle Wash-Down Area:

.1 Establish a wash down area for trucks and cars to remove mud and soil adhered to traffic

.2 Equip wash down area with sedimentation control devices and water supply

.3 Establish a filtering system to prevent gasoline, diesel fuel or anti-freeze from being flushed into surface drainage system.

.4 For storage of soaps, detergents, or solvents, you must provide either (1) cover (e.g., plastic sheeting or temporary roofs) to prevent these detergents from coming into contact with rainwater, or (2) a similarly effective means designed to prevent the discharge of pollutants from these areas.

.5 Do not allow mud and soil to accumulate on public roadways

.2 Sedimentation Control Basins, Silt Fences and Erosion Control Blankets:

.1 Establish a sedimentation pond of sufficient size or geotextile filtering system to control sedimentation from entering surface drainage or street drainage and sewerage systems.

.2 Regularly remove accumulations of silt and dispose off site at a recognized landfill facility.

.3 Reapply erosion control polymer as it biodegrades or is worn away from construction activities.

.4 Repair silt fences and erosion control blankets when torn; securely attach fabric to posts; firmly embed posts into ground.

.5 Weight and peg erosion control blankets so that blankets are in full contact with ground; spaces and gaps under blankets will result in increased erosion rendering this measure ineffective.

.3 Stabilized Construction Entrance:

.1 Establish a clean gravel pad at construction entrances of sufficient length and depth to trap clay and excavation debris; clean gravel on a regular basis to prevent build up of clay and prevent sediment from being tracked onto roadways.

.4 Housekeeping:

.1 Monitor vehicles for leaks and repair where leakage of polluting liquids are observed; liquids include, but are not limited to: gasoline, oil, diesel fuel, anti-freeze, brake or transmission fluid or other substance that may be harmful if released into the environment or storm drainage systems.

.2 Store petroleum products in clearly labelled sealed containers; provide spill kits at fueling and maintenance areas; provide impermeable tarp at fueling and maintenance areas.

.3 Provide a covered hopper or collection skid for waste materials.

.4 Tightly seal and store paint containers and sealing or curing compounds when not required and store in a protected location; do not discharge excess materials into storm drainage system.

.5 Do not allow concrete trucks to washout, or discharge surplus concrete or drum wash water on site; dispose of at recognized disposal facility.

.6 Place absorbent materials to soak up excess form release agents; replace absorbent materials when they become saturated at a recognized disposal facility.

3.5 Inspection and Maintenance

.1 Inspect all erosion and sedimentation control measures at least once each week and following any significant storm event (0.25 inches of precipitation or greater).

.2 All erosion and sedimentation control measures must be maintained in good working order. If maintenance or repairs are identified they must be completed within 24 hours.

.3 Schedule E1 – ESC Inspection Report must be completed for each inspection.

.4 Inspection procedures specified below summarize the EPA document and shall be followed in conjunction with details, drawings, and manufacturer requirements.

.1 Stabilized Construction Entrance: Apply additional gravel as required, remove sediments and other materials from all areas to minimize clogging. Keep adjacent public roadway(s) free of sediment.

.2 Material Stockpile: Inspect for effective prevention of runoff and erosion.

.3 Temporary Seeding: If plants do not grow quickly or thick enough to prevent erosion, reseed the area as soon as possible. Keep seeded areas adequately moist. If irrigation is required, over-watering shall be avoided. Phosphorus-containing fertilizers are not to be used.

.4 Permanent Seeding: Inspect for sufficient growth and water conditions. Replant areas as per installation instructions (refer to 3.01C.2) if cover does not provide erosion control.

.5 Mulching: Inspect to ensure mulching is not loose or removed. Apply additional mulch or reseed if necessary. If mulch binder is required, apply at rates specified by the manufacturer. Employ alternative controls if current measures are not effective.

.6 Preservation of Natural Vegetation: Routine maintenance shall include mowing, fertilizing, liming, irrigating, pruning, and weed and pest control, depending on the specific species and environmental conditions. Remove any debris, and ensure area is protected from traffic.

.7 Buffer Zones: Routine maintenance shall include mowing, fertilizing, liming, irrigating, pruning, and weed and pest control, depending on the specific species and environmental conditions. Remove any debris, and ensure area is protected from traffic.

.8 Soil Retaining Measures: Inspect for structural damage and repair as required.

.9 Sod Stabilization: Remove and replace dead sod. Ensure area receives sufficient water. If irrigation is required do not over-water.

.10 Silt Fence: Silt fence to be inspected for depth of sediment, tears, loose fabric attachment at the fence posts, channel erosion beneath fence, sagging or collapse and to ensure the fence posts are firmly in the ground. Built up sediment is to be removed from silt fence when it has reached one-third the height of the fence. Repair such that fence is in original installation condition.

.11 Outlet Protection: Inspect outlet for erosion and pooling of water. Necessary repairs to be made as required to reduce exit velocity of runoff. If a riprap apron is used, inspect for riprap displacement and damage to filter fabric.

.12 Inlet Protection: Inspect that measures are in original installed condition. Ensure measures are effectively trapping sediment. Remove accumulated sediment and debris when it reaches ½ the design depth of the trap. Repair protection measures as required.

.13 Surface Roughening: Inspect for small eroded watercourses, as little as a few inches deep, or washout of roughened grading. Fill, regrade, and reseed immediately.

.14 Check Dams: Inspect for sediment and debris accumulation and erosion of sides. Sediment should be removed when it reaches one half the original dam height. Repair dams as required.

.15 Drainage Swale: Inspect for dips or low points along the swale where water is pooling and ensure that runoff is being directed to sediment trapping measure used onsite.

.16 Interceptor Dikes and Swales: For swales inspect for dips or low points along the swale where water is pooling and ensure that runoff is being directed to sediment-trapping measure used onsite. For dikes ensure runoff is being directed to sediment-trapping measure used onsite and that it is compacted and free of low points for water collection.

.17 Earth Dike: Ensure runoff is being directed to sediment-trapping measure used onsite and that it is compacted and free of low points for water collection.

.18 Gravel or Stone Filter Berm: Inspect for breach in structure caused by vehicles and accumulated sediment. Replace filter material if needed, and remove and properly dispose of accumulated sediment.

.19 Sediment Trap: Remove sediment when it reaches 300mm in depth. If outlet becomes clogged with sediment it must be cleaned to restore flow capacity. Maintain until site area is permanently stabilized and/or permanent structures are in place. Ensure bank is sufficiently compacted and stabilized such that erosion into the basin does not occur.

.20 Temporary Sediment Basin: Remove sediment when it reaches 300mm in depth. If outlet becomes clogged with sediment it must be cleaned to restore flow capacity. Maintain until site area is permanently stabilized and/or permanent structures are in place. Ensure bank is sufficiently compacted and stabilized such that erosion into the basin does not occur.

.21 Pipe Slope Drains: Ensure runoff does not bypass the inlet, undercutting the structure. Repair undercutting at inlet if needed. If required, install a headwall, riprap, or sandbags around the inlet. Inspect pipes for leakage. Repair leaks and restore damaged slopes. If evidence exists of pipe movement, install additional anchor stakes to secure slope.

.22 Subsurface Drains: Inspect for pipe breaks or clogging by sediment, debris, or tree roots. Remove blockage immediately, replace any broken sections, and re-stabilize the surface. Check inlets and outlets for sediment or debris, and remove and dispose of these materials properly.

.23 Temporary Storm Drain Diversion: Ensure flow is being properly directed towards sediment-trapping device. When construction is complete, move diversion, flush storm drain prior to removal of sediment trap/basin, stabilize outfall, and restore grade areas.

.5 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.6 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal. Erosion and sedimentation control measures shall be maintained and inspected until final landscaping is complete

END OF SECTION

Schedule E1 Erosion and Sediment Control Inspection Log

Complete at least weekly, submit to Contract Administrator monthly. Include three photo references for each measure listed (as applicable), photos are to be date stamped and submitted to the Contract Administrator as .jpeg files.

General Information

Company Name:		Inspection Date:	

Inspection Frequency *(Note: you may be subject to different inspection frequencies in different areas of the site. Check all that apply.)*

Standard Frequency: ☐ Weekly OR ☐ Every 14 days and within 24 hours of a 6mm rain

Increased Frequency: ☐ Every 7 days and within 24 hours of a 0.25" rain (for areas of sites discharging to Sensitive Waters)

Reduced Frequency:

☐ Once per month (for stabilized areas)

☐ Once per month and within 24 hours of a 6mm rain (for arid, semi-arid, or drought-stricken areas during seasonally dry periods or during drought)

☐ Once per month (for frozen conditions where earth-disturbing activities are being conducted)

Was this inspection triggered by a 6mm storm event? ☐ Yes ☐ No **If yes, how was it determined?** ☐ Rain gauge on site ☐ Local weather station

Specify Weather station source: **Total rainfall amount that triggered the inspection (in mm):**

Check for the presence of conditions that could lead to spills, leaks, or other accumulations of pollutants on the site. Inspect the following (if applicable):

☐ Fueling and maintenance of equipment or vehicles

☐ Washing of equipment and vehicles;

☐ Storage, handling, and disposal of construction materials, products, and wastes;

☐ Washing of applicators and containers used for paint, concrete, or other materials.

Erosion and Sediment Controls (CGP Part 2.1) & Pollution Prevention (CGP Part 2.3) Inspection Log

ID #	E&S/PP Control Measure	Repairs or Other Maintenance Required?	Corrective Action Required?	Notes – Repairs, maintenance and/or corrective actions taken	Photo Reference (attached as .jpeg)		
01	*Silt Fence*	☒ Yes ☐ No	☒ Yes ☐ No	*Tear noticed in section along North perimeter, replaced filter fabric in this section.*	*100100.jpeg*	*100101.jpeg*	*100102.jpeg*
02	*Stabilized Construction Entrance*	☐ Yes ☐ No	☐ Yes ☐ No				
03	*Stockpiled Soil*	☐ Yes ☐ No	☐ Yes ☐ No				
04	*Dust Control*	☐ Yes ☐ No	☐ Yes ☐ No				

Schedule E1 Erosion and Sediment Control Inspection Log

05	*Storm Drain Inlet*	☐ Yes ☐ No	☐ Yes ☐ No				

Stabilization of Exposed Soil (CGP Part 2.2) Inspection Log

ID #	Stabilization Area	Stabilization Method	Have you Initiated Stabilization?	Notes – Progress made and additional actions necessary to complete
01	*Main Entrance*	*Temporary Seeding*	☒ Yes ☐ No If yes, date: 2017-05-01	*Native seed mix was applied to the graded topsoil area around the main entrance.*
02			☐ Yes ☐ No If yes, date:	
03			☐ Yes ☐ No If yes, date:	
04			☐ Yes ☐ No If yes, date:	

Description of Discharges (CGP Part 4.1.6.6)

ID #	ID# - Discharge Location	Observations	
		At points of discharge and the channels and banks of surface waters in the immediate vicinity, are there any visible signs of erosion and/or sediment accumulation that can be attributed to your discharge?	If yes, describe what you see, specify the location(s) where these conditions were found, and indicate whether modification, maintenance, or corrective action is needed to resolve the issue:
01	*Rouge River*	☐ Yes ☒ No	

Other Observations

I hereby certify that the information provided above is complete and correct

Name, Title _____ Phone Number _____ Signature _____

PART 1- GENERAL

1.1 Section Includes

.1 Availability of Materials.

.2 Material handling.

.3 Material requirements and quality.

1.2 Availability of Products

.1 Promptly upon Contract award and periodically during construction, review and confirm Material availability and delivery times. Order Materials in sufficient time to meet the construction progress schedule and the Contract Time.

.1 Failure to order a specified Material or to order a Material by a specified manufacturer in adequate time to meet construction progress schedule shall not be considered a valid reason for a Material substitution in accordance with Section 01 25 00.

.2 In the event of delays in supply of Materials as a result of failure to order a specified Material or order a Material by a specified manufacturer in adequate time to meet construction progress schedule, and should it appear that the Work may be delayed for such reason, Contract Administrator reserves the right to substitute more readily available Materials of similar character, at no additional cost to the City.

.2 If a specified Material is no longer available, promptly notify the Contract Administrator. The Contract Administrator shall take action as required.

1.3 Material Handling

.1 Handle and store Materials in accordance with manufacturer's and supplier's written requirements to prevent damage, adulteration, deterioration, and soiling and to preserve their quality and fitness for the Work.

.1 Submit manufacturer's and supplier's written requirements for handling and storage of their Materials.

.2 Where manufacturer or supplier does not have written handling and storage requirements already published, submit written requirements for handling and storage of their Materials prepared for the Work by the Material manufacturer or supplier, as applicable.

.3 Submit following procedures for submittal of Material data sheets in accordance with Section 01 33 00.

.2 Protect stored Materials from vandalism and theft.

.3 Store packaged or bundled Materials in original and undamaged condition with manufacturer's seals and labels intact, facing to outside. Do not remove from packaging or bundling until required in the Work.

.4 Store materials susceptible to environmental damage in a weathertight enclosure raised clear of ground so that they are protected from weather, dampness, and deterioration. Do not use materials which have been damaged by exposure to moisture.

.5 Keep sand, when used as ingredients for grout, mortar, or similar mixed materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber, and other similar Materials on flat, solid supports and keep clear of ground or slab. Slope to shed moisture.

.7 Handle materials to prevent damage to existing surfaces and work of others.

.8 Remove damaged Materials and replace with new undamaged Materials.

.9 Transportation:

.1 Pay cost of transportation of Materials required in performance of Work.

.2 Transportation cost of Materials supplied by City will be paid for by City. Unload, handle and store such Materials at the Site.

.3 Reject Materials damaged during transport.

.4 Transportation of Materials shall be undertaken to suit construction schedule.

PART 2 - PRODUCTS

2.1 Material Requirements and Quality

.1 Comply with LEED requirements in accordance with Section 01 33 29.

.2 Compatibility of options: If given option of selecting between two or more Materials, select Material compatible with products previously selected, even if previously selected products were also options.

.1 Unless otherwise indicated in the Contract Documents, maintain uniformity of Material and manufacturer for any like item, material, equipment or assembly for the duration of the Work.

.3 Materials used for temporary facilities may have been previously used, providing they are sound in structural qualities.

.4 Materials and Material installation shall be in compliance with building code, regulations and requirements of authorities having jurisdiction.

.5 Specified options: The Work is based on materials, Materials and systems specified by manufacturer's catalogued trade names, references to standards, by prescriptive Specifications and by performance Specifications.

.1 Wherever a Material or manufacturer is specified by a single proprietary name, provide the named Material only.

.2 Wherever more than one Material or manufacturer is specified by proprietary name for a single application, provide any one of the named Material.

.3 Wherever a Material is specified by reference to a standard only, provide any Material that meets or exceeds the specified standard. If requested by Contract Administrator, submit information verifying that the proposed Material meets or exceeds the specified standard.

.4 Wherever a Material is specified by descriptive or performance requirements only, provide any Material that meets or exceeds the specified requirements. If requested by Contract Administrator, submit information verifying that the proposed Material meets or exceeds the specified requirements.

.5 The onus is on the Contractor to prove compliance with governing published standards, prescriptive Specifications and with performance Specifications.

.6 Visual selection Specifications:

.1 Where Specifications include the phrase "as selected by Contract Administrator from manufacturer's full range" or similar phrase, select a Material that complies with requirements. Contract Administrator will select colour, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

.7 Visual matching Specifications:

.1 Where Specifications require "match Contract Administrator’s sample", provide a Material that complies with requirements and matches Contract Administrator’s sample. Contract Administrator’s decision will be final on whether a proposed Material matches.

.6 Provide Materials that are not damaged or defective, and suitable for purpose intended, subject to specified requirements. If requested by Contract Administrator, furnish evidence as to type, source and quality of Materials provided.

.1 Defective Materials, whenever identified prior to completion of the Work, will be rejected, regardless of previous reviews. Review of the Work by the Contract Administrator or independent inspection and testing companies does not relieve the Contractor of the responsibility for executing the Work in accordance with the requirements of the Contract Documents, but is a precaution against oversight or error.

.7 Basis of design:

.1 Where Contract Documents list “basis of design”, this indicates the Material or system that was used in the preparation of the design included in the Contract Documents, and which shall be an acceptable Material.

.2 The basis of design establishes the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable Materials from other manufacturers.

.3 The term “basis of design” does not preclude the use of other Materials or systems in the Work, provided the proposed Material or system complies with the design and performance requirements contained in the Contract Documents.

.4 Proposals for use of Materials or systems in the Work that are not the named “basis of design” must be submitted in accordance with the following procedures:

.1 Do not order or install any proposed Materials or systems without a Field Instruction.

.2 Provided a proposal includes the information specified in Section 01 60 00, Contract Administrator will review submission, but in any case with the understanding that neither the Contract Time nor the Contract Price will be altered due to the time required by the Contract Administrator to review the submission and by the Contractor to incorporate the proposed Materials or systems in the Work.

.3 The proposed Materials or systems shall be accepted by the Contract Administrator if:

.1 The proposed Materials or systems are the same type as, are capable of performing the same functions as, interfaces with adjacent work the same as, and meets or exceeds the standard of quality, performance and, if applicable, appearance and maintenance considerations, of the specified Material or system.

.2 The manufacturer of the proposed Materials or systems has capabilities comparable to the specified manufacturer.

.4 If the proposed Materials or systems are accepted, the change in the Work will be documented in the form of a Field Instruction.

.5 If the proposed Materials or systems are accepted, Contractor shall not revert to an originally specified Material or manufacturer without Contract Administrator's prior written acceptance.

.6 Proposed Material or system submitted on Shop Drawings without following requirements of this section prior to submission of the affected Shop Drawings will cause the Shop Drawings to be rejected.

.7 Include with each proposal the following information:

.1 Identification of the proposed Material or system, including Material name and manufacturer's name, address, telephone numbers, and web site.

.2 A statement verifying that the proposed Material or system will affect neither the Contract Price nor the Contract Time.

.3 A statement verifying that the proposed Material or system will not affect the performance or warranty of other parts of the Work.

.4 Manufacturer's Material literature for the proposed Material or system, including material descriptions, compliance with applicable codes and reference standards, performance and test data, compatibility with contiguous materials and systems, and environmental considerations.

.5 Material samples as applicable.

.6 A detailed comparison of the physical properties and performance characteristics of the basis of design Material or system and the proposed Material or system, with any significant variations clearly highlighted.

.7 Availability of maintenance services and sources of replacement materials and parts for the proposed Material or system, as applicable, including associated costs and time frames.

.8 Details of other projects and applications where the proposed Material or system has been used.

.9 Identification of any consequential changes in the Work to accommodate the proposed Material or system and any consequential effects on the performance of the Work as a whole. A later claim for an increase to the either the Contract Price or the Contract Time for other changes in the Work attributable to the proposed Material or system will not be considered.

.10 Confirmation of delivery schedule of the proposed Material or system, in writing by Material manufacturer.

.11 Compliance with the building codes and requirements of authorities having jurisdiction.

.12 Copy of manufacturer's warranty for any Material or system for which an extended warranty has been specified, along with copy of manufacturer's warranty for specified Material or system with differences highlighted.

.8 Where Contract Documents require design of a Material or system, and minimum material requirements are specified, the design of such Material or system shall employ materials specified within applicable section. Where secondary materials or components are not specified, augment with materials meeting applicable code limitations, and incorporating compatibility criteria with adjacent work.

.9 Should dispute arise as to quality or fitness of Materials, the decision rests strictly with Contract Administrator based upon the requirements of the Contract Documents.

.10 Materials exposed in the finished work shall be uniform in colour, texture, range, and quality, and be from one production run or batch, unless otherwise indicated.

.11 City retains right to select from choices available within specified Materials for colours, patterns, finishes or other options normally made available. Submit full range of Material options in accordance with Section 01 33 00 for such selection.

.12 Exposed to weather: Materials and materials in environments not protected by the building's HVAC and/or climate control systems shall be considered exposed to weather.

PART 3 – EXECUTION

Not applicable.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Examination of the Site, documents, surfaces and conditions.

.2 Public utilities and services.

.3 Setting out the Work.

1.2 Examination of the Site, Documents, Surfaces and Conditions

.1 Examine the Site and investigate matters relating to the nature of the Work, means of access and egress, obstacles, rights and interests of other parties which may be interfered with during the execution of the Work, conditions and limitations including obstructions, existing structures or facilities, local conditions, actual levels, character and nature of the Work, and other consideration which may affect performance of the Work.

.2 Examine the extent of work to be performed and matters which are referred to in the Contract Documents prior to start of the Work.

.3 Examine work to which work is to be applied, anchored or connected, and relevant as-built conditions.

.4 Each work operation following on a previous work operation of a differing Subcontractor, shall include a thorough examination of the condition of the previous work to verify that work is complete and in a condition suitable to receive the subsequent work. Conditions found unacceptable, either for the commencement of the new work or its satisfactory completion, shall be reported in writing to the Contract Administrator.

.5 Verify that ambient conditions are suitable before commencing the work of any Section and will remain suitable for as long as required for proper setting, curing, or drying of Materials used.

.1 Do not commence installation of interior finishes until after building is enclosed, with windows and exterior doors in place and glazed, and roof watertight.

.6 Ensure that substrate surfaces are clean, dimensionally stable, cured and free of contaminants.

.7 Do not commence work until unsatisfactory conditions are corrected. Commencement of work shall mean acceptance of surfaces, tolerances, and conditions, and existing conditions will not be accepted as a contributing factor to subsequent failure or unacceptability of the Work.

.8 Work adjacent to public property:

.1 Verify before commencing portions of the Work adjacent to public and private properties, that no plans for altering clearances, set-backs, easements, grades, or otherwise have been established by authorities having jurisdiction, subsequent to issuance of the building permit.

.2 Notify Contract Administrator of any such plans that will affect the Work and proceed as directed by Contract Administrator.

1.3 Public Utilities and Services

.1 Prior to commencement of the Work at the Site, verify limitations imposed on the Work by presence of utilities and services, and cause no damage to them as a result of the Work.

.2 Before commencing excavation, drilling or other earthwork, establish or confirm location and extent of existing underground utilities and structures at the Site.

.3 Promptly notify Contract Administrator if underground utilities, structures, or their locations differ from those indicated in Contract Documents or in available project information. Contract Administrator will provide appropriate direction.

.4 Notify service authorities concerned so that they may protect, remove, relocate, or discontinue existing utilities and services, as they may require.

.5 Record locations of maintained, re-routed, and abandoned utility lines.

1.4 Setting Out the Work

.1 Assume full responsibility for and execute complete layout of the Work to required locations, lines and elevations.

.1 Do not change or relocate reference points without prior written notice to Contract Administrator.

.2 Report to Contract Administrator when a reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.3 Replace, at no additional cost to the City, any iron pins and survey bars, monuments, geodetic datum and similar reference markers, which are disturbed, moved, or lost in course of construction. Require registered land surveyor to replace reference points in accordance with original survey.

.2 Arrange meeting with Contract Administrator to discuss critical setting out assumptions for the Work and establish limiting conditions for setting out the Work. Contractor shall chair and prepare minutes of the meeting, and prepare and submit sketches recording understanding of key setting out principles.

.3 Establish sufficient permanent benchmarks on site, referenced to established benchmarks by survey control points.

.4 Establish existing bench marks, grades, lines, levels, and temporary, widely separated bench marks. Employ the services of a firm of registered land surveyors licensed in the Site.

.1 Submit name and address of registered land surveyor performing survey work.

.5 Surveyor shall verify grades, lines, levels at the Site, critical setting out points specified herein, and dimensions shown, and report discrepancies in levels or dimensions before commencing Work. Where discrepancies between intended layout and existing conditions are found to exist, prepare and submit a detailed report to Contract Administrator, including schematic digital layout of conflicting conditions, in format compatible with AutoCAD/Revit 2024 software for Contract Administrator’s use in reconciling these issues. Surveyor shall lay out building areas, and floor elevations.

.6 Surveyor shall verify location and datum reference elevation of finished foundations, relative to reference markers, showing actual finished grades in relation to noted grades in the Contract Documents. Prepare and submit a reproducible plan of survey certified As-Built by above firm and in format compatible with AutoCAD/Revit 2024 software, prior to date of Substantial Performance.

.7 Preserve bench marks, reference points and stakes.

.8 Upon completion of foundation work, prepare and submit an accurate survey showing the location of the foundations at the Site, foundation wall dimensions, and the gross floor area of the foundation plan. The survey is to be prepared by a Registered Land Surveyor acceptable to the City and to the Contract Administrator. Submit a digital copy of this survey to the Contract Administrator at time of completion of foundation work. Submit additional copies as part of the closeout submittals in accordance with Section 01 78 00.

.9 Maintain a complete, accurate log of control and survey work as it progresses. Record locations with horizontal and vertical data in project record documents in accordance with Section 01 78 00.

.10 Prepare and submit record survey documents and survey logs for incorporation into project record documents in accordance with Section 01 78 00.

PART 2 - PRODUCTS
Not applicable.

PART 3 – EXECUTION
Not applicable.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Work on public property.

.2 Inserts, anchors, and fasteners.

.3 Penetrations.

.4 Concealed services.

.5 Trademarks and labels.

.6 Interferences.

.7 Publicity releases and photographs.

.8 Coordination with City's commissioning activities.

.9 Manufacturer's instructions.

.10 Galvanic/dissimilar metal corrosion.

.11 Workmanship.

.12 General construction tolerances.

1.2 Work on Public Property

.1 Include curb cuts and making good of existing property to provide fully paved and finished approaches to requirements of authorities having jurisdiction.

.2 Include making good of existing curbs, walks, paving and soft landscaping on adjacent property.

1.3 Inserts, Anchors, and Fasteners

.1 Use only factory made, threaded or toggle type inserts as required for supports and anchors, properly sized for load to be carried.

.2 Where inserts cannot be placed, use factory made expansion shields for light weights only.

.3 Supply and locate inserts, holes, anchor bolts and sleeves during placement or fabrication of structural elements.

.4 Fasteners stressed in withdrawal are not acceptable, except where otherwise indicated.

.5 Prevent electrolytic action and corrosion between dissimilar metals and materials by using suitable non-metallic strips, washers, sleeves, or other permanent separators to prevent direct contact.

.6 Use non-corrosive fasteners and anchors for securing exterior work and in spaces where high humidity levels are anticipated.

.7 Space anchors within individual load limit or shear capacity and install such that they provide positive permanent anchorage.

.8 Keep exposed fastenings to a minimum, space evenly and install neatly.

.9 Fastenings for prefinished materials shall be of concealed type unless otherwise indicated, and when exposed finish is required, of matching prefinishing materials.

.10 Do not use fastenings or fastening methods that may cause spalling or cracking of material to which anchorage is made.

.11 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.12 Bolts shall not project more than one diameter beyond nuts.

.13 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials being fastened.

.14 Power actuated fasteners:

.1 Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E1190-21 conducted by a qualified independent testing agency.

.2 Do not use power actuated fasteners which are stressed in withdrawal in finished work.

.3 Do not use power actuated fasteners within 100 mm (4") of the edge of concrete or masonry, unless otherwise accepted in writing by Contract Administrator.

.4 Do not use power actuated fasteners in post-tensioned concrete.

1.4 Penetrations

.1 Holes or voids created in assemblies or partitions for penetrating mechanical, electrical, or sprinkler service items, shall be of sufficient size to accommodate the penetrating item as well as additional required fill materials, such as sealants, firestopping and smoke sealants, insulation, and the like, without exceeding the maximum opening allowable by the manufacturer of the additional required fill material.

.2 When penetrating fire rated walls, ceiling, or floor assemblies, completely seal voids with firestopping materials, smoke seals, or both, in full thickness of the construction element as required to maintain the integrity of the fire rated assembly.

1.5 Concealed Services

.1 Unless otherwise indicated, conceal pipes, ducts, and wiring in floors, walls, and ceilings in finished areas. Do not conceal until after:

.1 Review by Contract Administrator and authority having jurisdiction.

.2 Recording actual locations on as-built drawings where locations differ from those shown on Drawings.

.2 Provide incidental furring or other enclosures as required.

.3 Notify Contract Administrator in writing of interferences before installation.

1.6 Trademark and Labels

.1 Trademarks and labels, including applied labels, shall not be visible in finished work in finished areas, unless otherwise accepted or indicated by Contract Administrator, and except for trademarks and labels:

.1 That are essential to identify materials, systems, assemblies, and equipment for maintenance and replacement purposes.

.2 That are essential for life safety, fire resistance, and temperature rise ratings.

1.7 Interferences

.1 Coordinate placement of equipment to ensure that components will be properly accommodated within spaces provided prior to commencement of the Work.

.2 Take complete responsibility for remedial work that results from failure to coordinate aspects of work prior to its fabrication/installation.

.3 Maintain accesses and clearance required by jurisdictional authorities and/or for easy maintenance of equipment in layout of equipment and services, Notify Contract Administrator if indicated clearances are in conflict.

.4 Prepare coordination and interference drawings in accordance with Section 01 31 00.

1.8 Publicity Releases and Photographs

.1 No press or publicity releases, including photographs of the Site, will be permitted without prior written approval of the City.

1.9 Coordination with City's Commissioning Activities

.1 The City has engaged a commissioning agent, referred to as the Building Commissioning Consultant.

.2 Contractor and Subcontractors are to designate individuals who will be assigned to commissioning activities and will attend commissioning meetings.

.3 Refer to Sections 01 91 13, 07 08 00, 08 08 00, Divisions 21, 22, and 23, and Divisions 26, 27, and 28 for specific requirements related to commissioning activities.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 Manufacturer's Instructions

.1 Install, erect, or apply Materials in accordance with manufacturer's written requirements. Do not rely on labels or enclosures supplied with Materials. Obtain written requirements directly from manufacturers.

.2 Notify Contract Administrator, in writing, of conflicts between Contract Documents and manufacturer’s instructions where, in Contractor’s opinion, conformance with Contract Documents instead of the manufacturer’s instructions may be detrimental to the Work or may jeopardize the manufacturer’s warranty.

.3 Improper installation or erection of Materials, due to failure in complying with these requirements, shall result in removal and re-installation of such Materials as part of the Work at no additional cost to the City.

.4 Provide manufacturer's representatives with access to the Work at all times. Render assistance and facilities for such access so that manufacturer's representatives may properly perform their responsibilities.

3.2 Galvanic/Dissimilar Metal Corrosion

.1 Insulate dissimilar metals from each other and from cementitious materials by suitable plastic strips, washers or sleeves, or other method in accordance with manufacturer's written requirements to prevent galvanic corrosion where conductive liquid or electrolyte exists or may reasonably be expected to exist.

3.3 Workmanship

.1 General:

.1 Execute the Work using workers experienced and skilled in the respective duties for which they are employed.

.2 Do not employ an unfit person or anyone unskilled in their required duties.

.3 Remove Materials or materials that have been broken, chipped, cracked, discoloured, abraded, or damaged during construction period and provide undamaged Materials or materials meeting the requirements of the Contract Documents.

.2 Coordination:

.1 Ensure cooperation of workers in layout of the Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

.3 Backer plates:

.1 Provide backer plates to support and provide anchorage base to carry loads from surface or recessed applied materials.

.4 Cutting and remedial work:

.1 Perform cutting and remedial work required to make parts of the Work come together. Coordinate the Work to ensure this requirement is maintained. Comply with requirements of Section 01 73 29.

.2 Notify Contract Administrator of, and perform remedial work required to, repair or replace defective or unacceptable work in accordance with requirements of applicable section of the Specifications. Ensure that properly qualified workers perform remedial work. Coordinate adjacent affected work as required.

.5 Location of fixtures:

.1 Locations of fixtures, access panels, outlets, and mechanical and electrical items indicated on Drawings are approximate only.

.2 Locate fixtures, outlets, and devices to provide minimum interference, maximum usable space, and as required to meet safety, access, maintenance, acoustic, and regulatory, including barrier free, requirements. Architectural drawings will relate these items to known dimensions, such as ceiling tile grid or wall locations and the like.

.3 Obtain Contract Administrator's acceptance for precise locations of fixtures, access panels, outlets, mechanical, and electrical items.

.4 Contract Administrator reserves the right to relocate electrical outlets and mechanical fixtures at a later date, but prior to installation, without cost, provided that the relocation per outlet does not exceed 3050 mm (10') from the original location.

.5 Promptly notify Contract Administrator in writing of conflicting installation requirements for fixtures, outlets, and devices. If requested, indicate proposed locations and obtain approval for actual locations.

.6 Protection of work in progress:

.1 Provide protection required by authorities having jurisdiction.

.2 Protect parts of the Work completed or in progress from soiling, abrasion, punctures, damage, and defacement, and maintain protection until the surrounding or overhead work is complete.

.3 Remove and replace materials damaged or defaced as a result of failure to provide adequate protection.

.4 Do not cut, drill, or sleeve any load bearing structural member without written permission of Contract Administrator. Comply with requirements of Section 01 73 29.

.5 Do not load or permit to be loaded any part of the Work with a weight or force that will endanger the safety or integrity of the Work.

.6 Protect finished flooring from damage. Take special measures when moving heavy loads or equipment on them.

.7 Keep surfaces free of oils, grease or other materials that may damage or deface them or affect bond of applied Materials.

.8 Protect existing buildings, curbs, roads and lanes. If, during the Work, any buildings, curbs, roads or lanes are damaged, bear costs for repairs.

.7 Protection of mechanical and electrical Materials or materials:

.1 Wrap in protective plastic and seal mechanical and electrical items and equipment prior to and during shipment, storage at the Site and after installation.

.2 Remove protective coverings only to the extent required for installation of the items. Re-install protection immediately following installation.

.3 Remove protective coverings in stages, as work areas are completed, or when directed by Contract Administrator.

.8 Operational requirements:

.1 Operable Materials shall be provided fully operational and ready for intended use.

.2 Adjust operating hardware and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts for smooth squeak-free function, in accordance with manufacturer's requirements.

.9 Alterations:

.1 Restore new or existing work which is altered as a result of the Work and Make Good.

.2 Materials and workmanship shall match existing materials and workmanship. Exposed materials shall match and blend in with the appearance of the existing undamaged surfaces in all respects including colours, textures, layout, jointing, and material types so as to not vary in appearance when compared to adjacent materials from a viewing distance of 1830 mm (6').

3.4 General Construction Tolerances

.1 Match existing tolerances in every respect unless otherwise specified.

.2 Where tolerances are not defined elsewhere in the Contract Documents or building code, construct the Work to the following tolerances:

.1 Maximum variation from plumb in vertical lines, surfaces of columns, walls, and arrises:

.1 6.4 mm (1/4") in 3 m (10 ft)

.2 9.6 mm (3/8") in a storey height not to exceed 6 m (20 ft)

.3 12.7 mm (1/2") in 12 m (40 ft) or more

.2 Maximum variation from plumb for external corners, expansion joints, and other conspicuous lines:

.1 6.4 mm (1/4") in any storey or 6 m (20 ft)

.2 12.7 mm (1/2") in 12 m (40 ft) or more

.3 Maximum variation from level of grades for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines:

.1 6.4 mm (1/4") in any bay or 6 m (20 ft)

.2 12.7 mm (1/2") in 12 m (40 ft) or more

.4 Maximum variation from drawing location of columns, walls, and partitions:

.1 12.7 mm (1/2") in any storey or 6 m (20 ft)

.2 19 mm (3/4") in 12 m (40 ft) or more.

.5 Maximum variation in cross-sectional dimension of columns and thicknesses of wall from dimensions indicated:

.1 Minus 6 mm (1/4")

.2 Plus 12.7 mm (1/2")

.6 Maximum variation from plane or from straight:

.1 3.2 mm (1/8") in 3 m (10 ft) under a 3 m (10 ft) straight edge.

.7 Maximum variation from angle indicated:

.1 10 seconds.

.8 Tolerances shall be non-cumulative.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Cutting, patching and remedial work.

1.2 Request for Cutting, Patching and Remedial Work

.1 Submittal Items:

.1 Comply with administrative requirements of Section 01 33 00.

.2 Submit written request in advance of cutting, coring, and alteration that affects or is likely to affect:

.1 Structural integrity of any element of Work.

.2 Integrity of weather-exposed or moisture-resistant elements.

.3 Efficiency, maintenance, or safety of any operational element.

.4 Visual qualities of sight-exposed elements.

.5 City or work of other contractors.

.6 Warranty of Materials affected.

.3 Include in request:

.1 Identification of project.

.2 Location and description of affected work, including drawings or sketches as required.

.3 Statement on necessity for cutting or alteration.

.4 Description of proposed work, and Materials to be used.

.5 Alternatives to cutting and patching.

.6 Effect on City or work of other contractors.

.7 Written permission of affected separate contractor.

.8 Date and time work will be performed.

.9 Non-destructive structural survey: Radiography (X-ray) imaging of work to be cut or cored.

.4 Do not commence cutting, patching, or remedial work until request has been reviewed by Contract Administrator.

PART 2 - PRODUCTS

2.1 Materials

.1 Unless otherwise specified, when replacing existing or previously installed Materials in the course of cutting and patching work, use replacement Materials of the same character and quality as those being replaced.

.2 If an existing or previously installed Material must be replaced with a different Material, submit request for substitution in accordance with Section 01 25 00.

PART 3 - EXECUTION

3.1 Preparation

.1 Inspect existing conditions in accordance with Section 01 71 00, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of the Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to maintain structural integrity of surroundings. Provide devices and methods to protect other portions of the Work from damage.

.5 Provide protection from elements for areas which may be exposed by uncovering work.

.6 Where uncovering of area exposes local deterioration, cracking, evidence of water infiltration, structural settlement, previous modifications, or other unexpected conditions, advise Contract Administrator immediately in writing and leave conditions exposed until receipt of Contract Administrator's written instructions. If area is exposed to the exterior, provide temporary protection from inclement weather.

3.2 Existing Services and Utilities

.1 Protect, relocate, or maintain existing active services or utilities except where breaking into or connecting to them. When inactive services are encountered, cap off in a manner approved by authority having jurisdiction and stake or otherwise record location of capped service. Record location of services, including depth, on as-built drawings.

.2 When breaking into or connecting to existing active services or utilities, execute the Work at times approved by City, with a minimum of disturbance to City's ongoing operations, the Work, and traffic. Give notice to authorities having jurisdiction as required by such authorities.

.3 Keep duration of interruptions to a minimum.

.4 Carry out interruptions outside regular working hours of occupants unless City's prior written approval is obtained.

.5 Construct or erect barriers in accordance with Section 01 56 00 as required to protect pedestrian and vehicular traffic.

3.3 Cutting and Patching

.1 Coordinate and perform the Work so that cutting and patching work is kept to a minimum.

.2 Execute cutting, fitting, and patching to complete the Work. Under no circumstances will overcutting of corners of opening be accepted. Ensure corners of openings to be cut are predrilled or sawed.

.3 Remove and replace defective and non-conforming work.

.4 Remove samples of installed work for testing if directed by Contract Administrator.

.5 Cut openings in non-structural elements of the Work for penetrations of mechanical and electrical work.

.6 Perform work by methods to avoid damage to other work, and to properly prepare surfaces to receive patching and finishing.

.7 Employ qualified installer with at least 3 years of relevant experience to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.8 Perform cutting, patching, and remedial work using competent and qualified specialists familiar with the Materials affected, in a manner that neither damages nor endangers the Work.

.9 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed to be used anywhere within existing buildings unless approved by Contract Administrator.

.10 Restore work with new Materials in accordance with requirements of Contract Documents.

.11 Fit work to pipes, sleeves, ducts, conduit, and other penetrations through surfaces and with suitable allowance for deflection, expansion, contraction, and firestopping.

.12 Enclose pipes, ducts, conduit and wires passing through floors at areas where faucets occur in a 100 mm (4") high metal sleeve and make air and watertight with water resistant firestopping.

.13 Completely seal voids of penetrations of fire rated wall, ceiling, and floor constructions with firestopping and smoke seals.

.14 Execute cutting, patching, and remedial work in manner that does not jeopardize manufacturers' warranties.

.15 Refinish surfaces to match adjacent finishes. Refinish continuous surfaces to nearest intersection. Refinish entire assembly units.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Cleaning.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 Cleaning

.1 General cleaning requirements:

.1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

.2 Store volatile wastes in covered metal containers, and remove from Site daily.

.3 Prevent accumulation of wastes which create hazardous conditions.

.4 Provide adequate ventilation during use of volatile or noxious substances. Do not rely on building ventilation systems for this purpose.

.5 Prevent cross-contamination during the cleaning process.

.6 Notify the Contract Administrator of the need for cleaning caused by City or other contractors.

.2 Materials:

.1 Use only cleaning materials in accordance with written requirements of manufacturer of surface to be cleaned and in accordance with written requirements of cleaning material manufacturer.

.3 Cleaning during construction/progressive cleaning:

.1 Clean-up the Site daily. Maintain clean and clear egress routes at all times.

.2 Maintain Site, grounds and public properties free from accumulations of waste materials and rubbish.

.3 Provide appropriate, clearly marked containers at the Site for collection of waste materials and rubbish. Remove waste materials and rubbish from the Site when containers become full.

.4 Clean interior building areas prior to start of finish work and maintain free of dust and other contaminants during finishing operations.

.5 Vacuum and clean interior building areas when ready to receive finish painting, and continue vacuum cleaning on an as-needed basis until Substantial Performance.

.6 Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces nor contaminate building systems.

.7 Promptly as the Work proceeds, on a daily basis and upon completion, clean up and remove rubbish, surplus materials and equipment.

.8 Remove as the work of this section progresses, corrosive and foreign materials which may set or become difficult to remove at time of final cleaning or which may damage members.

.9 Wash exposed surfaces with a cleaning solution approved by Material manufacturers.

.10 Debris and waste not permitted within cavities of Work.

.4 Cleaning prior to *Substantial Performance of the Work*:

.1 Immediately prior to Contract Administrator's review to determine if *Substantial Performance of the Work* has been achieved, remove surplus Materials and construction machinery and equipment not required for the performance of the remaining Work and clean in accordance with Final Cleaning paragraphs in Section 01 74 00 to the greatest extent practicable given work remaining to be completed. Cleaning shall be to a sufficient extent to permit the Contract Administrator's review to be performed properly and reasonably.

.5 Final cleaning:

.1 Provide professional cleaning company for final cleaning.

.2 Before final cleaning, arrange a meeting at Site to determine the acceptable standard of cleaning. Ensure that cleaning company, City, Contract Administrator, and Contractor are in attendance.

.3 Remove from Site surplus Materials, waste materials, recyclables, Temporary Work, and Plant not required to perform any remaining work and other than that caused by the City, and leave the Work clean and suitable for occupancy by City.

.4 Remove waste material and debris from crawlspaces and other accessible concealed spaces.

.5 Clean and polish prefinished and finished surfaces including: glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or otherwise damaged glass.

.6 Clean exterior and interior window glass and frames.

.7 Remove stains, spots, marks and dirt from decorative parts of the Work, electrical and mechanical fixtures, furniture fittings, walls, and floors.

.8 Vacuum clean and remove dust from building interiors, exposed wall, floor, and ceiling surfaces, behind grilles, louvres, and screens, and above suspended ceiling tiles and panels. Vacuum clean interior of electrical equipment.

.9 Clean floor finishes in accordance with manufacturer's written requirements.

.10 Remove non-permanent labels.

.11 Remove dirt and residue from surfaces.

.12 Inspect finishes, fittings and equipment and ensure specified workmanship and operation.

.13 Remove protective coatings, clean surfaces and remove excess compounds and sealant materials. Make good defective, scratched or damaged work.

.14 Broom clean and wash exterior walks, steps, paved areas, and surfaces.

.15 Remove dirt and disfigurations from exterior surfaces.

.16 Clean and sweep roofs, gutters, areaways, downspouts, and drainage systems.

.17 Clean equipment and fixtures to a sanitary condition,

.18 Remove seal wrap and protective coverings from mechanical and electrical Materials and materials and clean as required.

.19 Clean mechanical, electrical, and other equipment. Replace filters for mechanical equipment.

.20 Clean and/or replace lighting reflectors, lamps, light fixtures, lenses, bulbs, and other lighting surfaces, and grilles.

.21 Clean architectural concrete to remove surface discolouration, efflorescence, and the like. Use a suitable cleaning agent which will not stain the surfaces or mar the texture.

.22 Use leaf blowers to clean landscaped surfaces.

.23 Lock or otherwise restrict access to each room or area after completing final cleaning in that area.

.24 Re-clean as necessary areas that have been accessed by Contractor’s workers prior to City occupancy.

END OF SECTION

PART 1– GENERAL

1.1 Section Overview

.1 Work in this Section includes, but is not limited to, requirements for Construction and Demolition Waste Management during construction, which forms the Contractor's commitment for LEED v4 Prerequisite MRp2 Construction and Demolition Waste Management and Credit MRc5 Construction and Demolition Waste Management.

.2 Waste Management Plan that provides guidance on a logical progression of tasks and procedures to be followed in a pollution prevention program to reduce or eliminate the generation of waste, the loss of natural resources, and process emissions through source reduction, reuse, recycling, and reclamation.

.3 Identifying any special programs, landfill options or alternatives to landfill.

.4 City has established that this Project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors be employed by the Contractor.

.5 City recognizes that waste in any project is inevitable, but indicates that as much of the waste materials as economically feasible shall be reused, salvaged, or recycled in order to divert materials away from landfill.

1.2 Related Sections

.1 Section 01 33 29 General LEED Requirements

1.3 References

.2 Canadian Construction Association Standard Construction Document :

.1 CCA 27-1997: A Guide on Construction Environmental Management Planning.

.2 CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.

.3 Canada. Public Works and Government Services Canada. 2002 National Construction Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.

1.4 Objectives

.1 Minimize the amount of solid waste generated by construction, renovation and demolition (CRD) activities.

.2 Meet the requirements of LEED v4 Prerequisite MRp2 Construction and Demolition Waste Management by writing a Construction and Demolition Waste Management Plan and issuing a Total Construction Waste Report.

.3 Divert at least 75% of the total construction and demolition materials from landfill using at least four material streams to achieve LEED v4 credit MRc5 Construction and Demolition Waste Management.

.1 A waste stream can be either of the following:

.1 A specific material category that is diverted in a specific way (plastic, metals, etc.); or

.2 A mixture of several material categories that are diverted in a specific way (materials sent to reuse markets, commingled waste sent to mixed waste recycling facility, source separation where each material is sent to a specific facility, manufacturers or suppliers take-back of materials, and reuse of deconstructed materials on site).

.4 All construction waste is to be site separated into bins specific to each material (e.g. metal, wood, gypsum, concrete, plastics, etc.)

.5 Comply with all applicable local environmental regulations related to waste management and pollution control.

.6 Comply with Canadian Construction Association's "Code of Practice" outlined in Standard Construction Document CCA 27-1997 to encourage improved waste management practices. Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.

1.5 Description of Work

.1 A LEED Coordinator (site superintendent or other individual designated by the Contractor) shall be responsible for coordinating all aspects of LEED coordination (during construction) related to construction waste management and disposal

.2 Construction Waste Management activities shall include:

.1 Arranging waste management service agreements with waste haulers and waste receiving facilities

.2 Supervising on-site waste management activities on a daily basis

.3 Coordinating waste management tasks with subcontractors to ensure timely and orderly progress of the work

.4 Preparing waste management documentation and submittals to summarize all shipments of waste materials from the project site

.5 Reporting waste management progress to the LEED Contract Administrator

1.6 Submittals

.1 Submit a Construction and Demolition Waste Management Plan to the Contract Administrator for approval a minimum of 14 days prior to construction

.2 The plan shall include the following:

.1 Establish waste diversion goals for the project by identifying at least five materials (both structural and nonstructural) targeted for diversion. Include an approximation of the overall project waste that these materials represent.

.2 Specify whether materials will be separated on site or comingled

.3 Describe the diversion strategies planned for the project and account for all materials, including land-clearing debris, alternate daily cover, and other materials.

.4 Describe specifically to which facility diverted materials will be taken and how the recycling facility will process the materials. Include letters for each receiving facility confirming the end use of the materials.

.5 Describe methods for safe removal and disposal of hazardous materials. Hazardous materials must be tracked separately and not included in the projects total waste.

.3 Submit a final Total Construction Waste Report detailing all major waste streams generated, including disposal and diversion rates

.4 Submit the following on a monthly basis to track waste diversion performance throughout construction

.1 Waybills, invoices, letters and other documentation that clearly indicates the receiving facility, end use (reused, recycled or landfill) and quantity of waste for each shipment of waste generated on the project site. Record each shipment using the Waste Tracking Log

.2 Submit an up-to-date copy of the Waste Tracking Log, including records of each waste shipment and the following associated information:

.1 Date of shipment

.2 Waste hauler

.3 Recycling Receiving Facility

.4 Waybill and/or invoice number with corresponding landfilled Mass and/or recycled material mass. Materials are to be recorded by type (ex. Gypsum, wood, concrete, plastic, metal, cardboard, etc.)

.5 Total mass of each recycled material type and landfilled mass

.6 Calculated diversion rate

.3 Certificate of the facility that processes and recycles commingled (mixed) construction and demolition waste materials.

PART 2 – PRODUCTS

2.1 Not Used

PART 3 - EXECUTION

3.1 Waste Management Plan Implementation

.1 Waste Reduction

.1 Encourage Suppliers and Subcontractors to retrieve/retain packaging (i.e. skids, plastic wrap, etc.) for reuse

.2 Suppliers and sub-contractors must provide a letter stating the item(s) will be reused and documenting the quantity removed from the site

.3 Prevent damage of materials due to mishandling, improper storage, and contamination

.4 Where possible, use prefabricated assemblies built at a central facility to avoid waste generation at the site

.5 Contact local salvaging/recycling facilities and arrange for recycling/reuse services. At a minimum, the proposed facilities must recycle/reuse the following waste materials that will be generated throughout construction:

.1 Land clearing debris

.2 Asphalt

.3 Concrete/masonry/stone

.4 Steel and other metals

.5 Wood

.6 Gypsum

.7 Cardboard

.8 Plastic

.9 Exclude excavated soil, land-clearing debris, and alternative daily cover (ADC).

.6 Include wood waste converted to fuel (biofuel) in the calculations; other types of waste-to-energy are not considered diversion for this credit.

.7 Provide a Construction and Demolition Waste Management Plan to the Contract Administrator for approval a minimum of 14 days prior to construction

.8 Contractor shall distribute copies of the Construction and Demolition Waste Management Plan to the Job Site Foreman and each Subcontractor

.9 Contractor shall provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, composting and return methods to be used by all parties at the appropriate stages of the Project.

.10 Contractor shall layout and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, composting and return. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.

.1 Commingled waste sent to a mixed waste recycling facility counts as a single material stream regardless of the number of different materials included.

.2 Hazardous wastes shall be separated, stored, and disposed of according to local regulations.

.2 Complete and submit Waste Tracking Log along with waybills, invoices, letters and other documentation to the Contract Administrator on a monthly basis, as outlined in Paragraph 1.6.

.3 Conduct daily inspections of material separation bins to check for and remedy cross-contamination

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 General Contract closeout procedures.

.2 Substantial Performance.

.3 Final inspection for completion of the Contract.

.4 Warranty period.

1.2 General *Contract* Closeout Procedures

.1 The procedures for completing Contract and acceptance by the City shall be in accordance with the methods prescribed by City.

.2 Stages will be reviewed at the Contract start-up meeting to ensure that parties understand their responsibilities. Refer to Section 01 31 19 for procedures and requirements for Contract start-up meeting.

.3 Within 4 weeks of commencement of the Work, submit to the Contract Administrator a list of closeout submittals required by the Contract Documents.

.4 Comply with LEED requirements in accordance with Section 01 33 29.

1.3 Substantial Performance

.1 The prerequisites to, and the procedures for, attaining Substantial Performance, or similar such milestone as provided for in the Builders Lien Act, shall be:

.1 As described in Section 01 77 00.

.2 In accordance with the Builders Lien Act.

.2 Deficiency review:

.1 Neither City nor Contract Administrator will be responsible for preparation or issuance of extensive lists of deficiencies. Contractor assumes prime responsibility for ensuring that items shown and described in the Contract Documents are complete. Any reviews to approve the certificate of Substantial Performance will be immediately cancelled if it becomes obvious to the Contract Administrator that extensive deficiencies are outstanding.

.2 The Contractor shall conduct an inspection of the Work to identify deficiencies and defects, which shall be repaired. When the Contractor considers that the Work is substantially performed, the Contractor shall prepare and submit to the Contract Administrator a comprehensive list of items to be completed or corrected (the deficiency list) and apply for a review of the Work by the Contract Administrator to determine if Substantial Performance has been achieved.

.3 The Contractor's request described above shall include a statement by Contractor that the Work to be reviewed by Contract Administrator for deficiencies is, to the best of the Contractor's knowledge, in compliance with Contract Documents, reviewed Shop Drawings, and samples, and that deficiencies and defects previously noted by Contract Administrator have been repaired.

.4 No later than 10 Working Days after the receipt of the Contractor's request described above, but contingent upon the prior receipt, by the Contract Administrator, of the closeout submittals in the manner and form specified in Section 01 78 00, the Contract Administrator and the Contractor will review the Work to identify any defects or deficiencies. If necessary, the Contractor shall tabulate a list of deficiencies to be corrected prior to Substantial Performance being certified by the Contract Administrator. During review, the Contract Administrator and the Contractor will decide which deficiencies or defects must be rectified before Substantial Performance can be certified, and which defects are to be treated as warranty items.

.5 Provide a schedule of planned deficiency review having regard to the foregoing.

.3 Certification of Substantial Performance:

.1 When the Contract Administrator considers that the deficiencies and defects have been completed and that it appears that the requirements of the Contract Documents have been substantially performed, the Contract Administrator shall issue a certificate of Substantial Performance to the Contractor, stating the date of Substantial Performance.

.2 The certificate of Substantial Performance shall be prepared and issued in accordance with the Builders Lien Act.

1.4 Total Performance of the Contract

.1 Deficiencies and defects shall be made good before the Contractor submits a written request for Total Performance review of the Work and before the Contract is considered complete.

.2 When Contractor is satisfied that the Work is complete, and after the Contractor has reviewed the Work to verify its completion in accordance with the requirements of the Contract Documents, the Contractor shall submit a written request for a final review by the Contract Administrator, who in turn will notify the City.

.3 If there are any deficiencies identified as a result of this review, they shall be listed by the Contract Administrator and submitted to the Contractor. This list shall be recognized as the final deficiency list for purposes of acceptance of the Work under the Contract.

.4 Such deficiencies shall be corrected by a date mutually agreed upon between Contract Administrator and the Contractor, unless a specific date is required by Contract, and a further review by the Contract Administrator shall be called for by the Contractor following his own review to take place within 7 days from date of request.

.5 Contractor shall thereafter submit invoice for final payment.

.6 Money withheld for deficiency work shall be released only when all deficiencies have been completed. No partial payment to be recognized until all work is completed.

.7 Certification of Total Performance:

.1 When the Contract Administrator considers that the requirements of the Contract Documents have been totally performed, the Contract Administrator shall issue a certificate of Total Performance to the Contractor, stating the date of Total Performance.

1.5 Warranty Period

.1 Provide on-going review and attendance to building call-back, maintenance and repair problems during the warranty periods.

.2 Within 30 calendar days prior to the expiry of the warranty period, the City, Contractor and Contract Administrator, along with key Subcontractors as designated, shall carry out a complete review of building and its systems to determine which deficiencies are to be rectified under the warranty. Contractor shall be responsible for timely written notification of City, and Contract Administrator prior to such end of warranty period inspection and any delay in such notification shall extend such warranty period until proper notification is received by City, and Contract Administrator.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

Not applicable.

END OF SECTION

PART 1- GENERAL

1.1 Section Includes

.1 As-built documents.

.2 Record drawings.

.3 Operation and maintenance manuals, including:

.1 Operation and maintenance book.

.2 Project data book.

.3 Shop drawing book.

.4 Warranty book.

.4 Posted operating instructions.

.5 Spare parts, maintenance materials, and special tools.

1.2 Administrative Requirements

.1 Collect reviewed submittals, and assemble required closeout submittals executed by Subcontractors, suppliers, and manufacturers. Prior to submitting closeout submittals to the Contract Administrator:

.1 Review maintenance manual contents (operating, maintenance instructions, as-built drawings, materials) for completeness.

.2 Review supply and completeness of spare parts required by Contract Documents and manufacturers.

.3 Review in relation to Contract Price, Changes in Work, holdbacks and other adjustments to the Contract Price.

.4 Review inspection and testing reports to verify conformance to intent of Contract Documents and that changes, repairs or replacements have been completed.

.5 Execute transition of performance bond and labour and materials payment bond to warranty period requirements.

.6 Submit a final statement of accounting giving total adjusted Contract Price, previous payments, and monies remaining at time of application for completion of the Contract. Contract Administrator will issue a final change order reflecting approved adjustments to Contract Price not previously made.

.2 No later than 20 Working Days prior to submitting request for Contract Administrator's review to determine if Substantial Performance has been achieved, submit to the Contract Administrator the closeout submittals specified in this section and elsewhere in the Contract Documents.

.3 For equipment put into use with City's permission during the Work, submit required closeout submittals within 10 Working Days after start-up.

.4 For items of the Work delayed materially beyond date of Substantial Performance, provide updated closeout submittals within 10 Working Days after acceptance, listing date of acceptance as start of warranty period.

.5 Neither the Contract Administrator's review to determine if Substantial Performance has been achieved, nor acceptance of the Work, will take place until receipt, by the Contract Administrator, of acceptable copies of the closeout submittals required herein and by the Contract Documents.

1.3 As-Built Documents

.1 Submit 4 sets of as-built documents in hard copy.

.2 In addition, submit digital scanned copy as a bookmarked PDF of as-built documents. Refer to Section 01 11 00 "Electronic Files" paragraph.

1.4 Record Drawings

.1 Once hard copy of as-built drawings have been accepted by Contract Administrator, Contractor shall receive digital media in format compatible with currently licensed edition of AutoCAD software from the Contract Administrator, to update drawings to reflect "As-Built" conditions as referenced above. Refer also to requirements of Divisions 21, 22, and 23 and Divisions 26, 27, and 28.

.2 Transcribe hard copy changes to the drawings into the electronic media.

.3 Mark revised Drawings as "RECORD DRAWINGS".

.4 After final acceptance by Contract Administrator, submit electronic copies of record drawings to City.

1.5 Operation and Maintenance Manuals

.1 Prepare a comprehensive operation and maintenance manual, in the language of the Contract, using personnel qualified and experienced for this task.

.2 Submit an initial draft of the operation and maintenance manual one month prior to Substantial Performance for Contract Administrator's review. If required by Contract Administrator's review comments, revise manual contents and resubmit for Contract Administrator's review. If required, repeat this process until Contract Administrator accepts the draft manual in writing.

.3 Submit operation and maintenance manuals as follows:

.1 Submit 4 hard copies and digital versions ("PDF" files) of operation and maintenance manuals. Files shall be original PDF files, not scanned, and shall be searchable.

.2 Submit using digital storage medium or transfer process acceptable to the Contract Administrator and the City.

1.6 Operation and Maintenance Manual Format

.1 Organize operation and maintenance manuals into the following general components:

.1 Operation and maintenance book.

.2 Project data book.

.3 Shop drawing book.

.4 Warranty book.

.2 Organize data in the form of an instructional manual.

.3 Text: Manufacturer's printed data, or typewritten data.

1.7 Operation and Maintenance Book

.1 Operation and maintenance books shall contain operating and maintenance data and information specified below for supplied Materials.

.2 Neatly type lists and notes. Use clear drawings, diagrams of manufacturers' literature.

.3 Each item of equipment and each system: include description of unit or system and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.4 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.5 Include installed colour coded wiring diagrams.

.6 Description, operation and maintenance instructions for equipment and parts list. Indicate nameplate information such as make, size, capacity, serial number.

.7 Operating procedures: include start up, break in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut down, and emergency instructions. Include summer, winter, and any special operating instructions.

.8 Maintenance requirements:

.1 Include routine procedures and guide for trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.2 Include manufacturer’s cleaning instructions, including recommended cleaning procedures, program, and cleaning materials. Include specific warnings against maintenance methods and materials harmful to finish of Materials and durability of installation.

.9 Provide servicing and lubrication schedule, and list of lubricants required.

.10 Include manufacturer's printed operation and maintenance instructions.

.11 Include sequence of operation by controls manufacturer.

.12 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.13 Provide installed control diagrams by controls manufacturer.

.14 Provide Contractor’s coordination drawings, with installed colour coded piping diagrams.

.15 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.16 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.17 Include testing and balancing reports.

.18 Include additional content as specified in technical Specifications sections.

1.8 Project Data Book

.1 Project Data Book shall include the following information supplemented by additional required data specified elsewhere in the Contract Documents:

.1 Maintenance instructions for finished surfaces and materials.

.2 Copy of hardware and paint schedules.

.3 Names, addresses and phone numbers of Subcontractors and suppliers, as applicable.

.4 Additional material used in the Work listed under various sections showing name of manufacturer and source of supply.

.5 Report recording demonstration and instruction provided to City for operation and maintenance of building systems as described in Section 01 79 00.

.6 Key construction photos.

.7 Permits and forms:

.1 Certificates of approval of the Work by local building department (if available).

.2 Electrical authority certificate of inspection.

.3 Elevator authority certificate of approval.

.8 Waste management and disposal reports, prepared in accordance with Section 01 74 19.

.9 *Integrated fire protection and life safety systems tests* final test report prepared in accordance with Section 01 91 26.

1.9 Shop Drawing Book

.1 Submit one copy of each final accepted Shop Drawings issued for the Work on which have been recorded changes made during fabrication and installation caused by unforeseen conditions.

.2 Engineered Shop Drawings shall include copies of the certificate of insurance, the engineer's field review reports, and the engineer's letter of assurance that were provided as part of the engineered submittal in accordance with Section 01 33 00 appended to the pertinent engineered Shop Drawings in the shop drawing manual.

1.10 Warranty Book

.1 Submit copies of bonds, guarantees, warranties and extended warranties together, complete with an indexed summary list of warranties and expiration dates. Warranties to be in accordance with Section 01 78 36.

.2 List each warrantor with complete contact information.

.3 Verify that documents are in proper form and contain full information. Warranties shall be for the correct duration and shall be in City's name.

.4 Include maintenance bond(s).

.5 Include summary of all warranties provided at front of Warranty Book.

1.11 Posted Operating Instructions

.1 Prepare operating instructions in English for posting near equipment and systems. Posted instructions to be glass covered, framed and mounted.

.2 Posted instructions to consist of simplified, consolidated equipment, control and power diagrams graphically representing the entire system, including concise instructions on how to start and stop systems, what settings and conditions are to be observed by the operators, and what control adjustments are to be made or maintained by the operator.

.3 Posted instructions shall include control diagrams with added specific operating instructions, controls, interlocks, and the like.

.4 Posted instructions shall include:

.1 HVAC controls for each system.

.2 Line schematic diagrams of water supply.

.3 Line isometric diagrams of sanitary drainage.

.4 Line diagrams of steam distribution, hot and cold water systems, including risers, valves, control devices, etc.

1.12 Spare Parts, Maintenance Materials, and Special Tools

.1 Provide overage, extra stock, and maintenance materials, including keys, in quantities specified in the Contract Documents.

.2 Submit to Contract Administrator a typed inventory list of maintenance materials prior to application for Substantial Performance. List all items, complete with quantities, and storage locations. Include Contract Administrator reviewed inventory listing in final submission to City.

.3 Prepare and submit a master list identifying maintenance materials and maintain a log of when materials are turned over to City and signing authority for acceptance of materials on behalf of City.

.4 Provide tags for special tools identifying their function and associated Material.

.5 Supply spare parts, maintenance materials, and special tools in quantities specified in technical Specifications sections.

.6 Ensure spare parts and maintenance materials are new, not damaged nor defective, and of same quality, manufacturer, and batch or production run as installed Materials.

.1 Replace incorrect or damaged maintenance materials.

.7 Deliver to and store items at location and time directed by City. Store in original packaging with manufacturer's labels intact and in a manner to prevent damage or deterioration.

.1 Clearly mark cartons or packaging as to contents, project name, and supplier.

.2 If applicable give colour and finish, room number or area where material is used.

.3 Include necessary information for re-ordering of materials as part of packaging of materials.

.8 Catalogue all items and submit to Contract Administrator an inventory listing organized by Specifications section. Include Contract Administrator reviewed inventory listing in operation and maintenance manual.

PART 2 - PRODUCTS
Not applicable.

PART 3 - EXECUTION
Not applicable.

END OF SECTION

PART 1 - GENERAL

1.1 Warranties

1.2 Extended Warranties

.1 Extended warranties shall be in accordance with the general conditions, as amended, and as follows:

.1 Where specifically identified in the Contract Documents, extended warranties shall be furnished by individual manufacturer for particular product/system/assembly otherwise, extended warranties shall be furnished by Subcontractor for a particular product/system/assembly/section of the Specifications.

.2 Extended warranties shall include for proper performance of the portion of the Work as defined by the scope of the applicable Specifications section to the extent that the design and Contract Documents permit such performance.

.3 The Contract Administrator shall promptly give the warrantor notice in writing of observed defects and deficiencies which occur during the warranty period.

.4 Extended warranties shall commence at date of Total Performance.

.5 Extended warranties specified shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranty do not relieve Contractor of obligations under requirements of the Contract Documents.

.6 Submit extended warranty on warrantor’s standard form specifically endorsed by the warrantor to the City and shall include the following information:

.1 Name and address of project.

.2 Warranty commencement date.

.3 Warranty period.

.4 Specific warranty terms as required in applicable portion of Contract Documents.

.5 Name and title of authorized signing officer and seal of warrantor.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

Not applicable.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Systems demonstration and training.

1.2 Preparation

.1 Prior to scheduling demonstration and training:

.1 Review condition of equipment or systems for which demonstration and training is required and that have been used in the course of the Work to ensure turning over at completion in "as new condition", with warranties dated and certified from time specified.

.2 When partial occupancy of uncompleted project is required by City, coordinate City's uses, requirements, access, and the like, with requirements to complete the Work.

1.3 Submittals

.1 Submit proposed dates, times, durations, and locations for demonstration and training of each item of equipment and each system for which demonstration and training is required. Allow sufficient time for training and demonstration for each item of equipment or system, or time as may be specified in technical Specifications.

.1 Correlate with construction schedule in accordance with Section 01 32 00.

.2 Contract Administrator and City will review submittal and advise Contractor of any necessary revisions.

.3 Submit report(s) within 5 Working Days after completion of demonstration and training:

.1 Identifying time and date of each demonstration and training session.

.2 Summarizing the demonstration and training performed.

.3 Including a list of attendees.

1.4 Demonstration and Training

.1 Perform system demonstration work no later than 25 Working Days prior to submitting request for Contract Administrator's review to determine if Substantial Performance has been achieved.

.1 Provide City with 5 Working Days prior written notice of dates scheduled for demonstration and training.

.2 Submit required certificates of approval or acceptance from authorities having jurisdiction.

.3 Prerequisites to demonstration and training:

.1 Testing, adjusting, and balancing has been performed in accordance with Contract Documents.

.2 Equipment and systems are fully operational.

.3 Copy of completed operation and maintenance manual is available for use in demonstration and training.

.4 Conditions for demonstration and training comply with requirements specified in technical Specifications.

.4 Demonstration and training:

.1 Demonstrate and provide training to City's personnel.

.2 Instruct City's personnel in operation and maintenance of equipment and systems, using operation and maintenance data provided as the basis for instructions. Arrange and coordinate instruction of City's staff in care, maintenance, and operation of building systems and finishes.

.3 Contractor, manufacturer's representatives, and responsible personnel from Subcontractors whose work is being demonstrated shall be present at these demonstrations, as well as City's personnel.

.4 City shall provide list of personnel to receive training and shall coordinate their attendance at agreed upon times.

.5 Demonstration shall include start up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment and system.

.6 Review operation and maintenance manual in detail to explain all aspects of operation and maintenance.

.7 Instruct City's representative on use of software required for operation and maintenance of building systems and provide a toll-free telephone number or website address for further assistance to the City.

.8 Prepare and insert additional data in the operation and maintenance data manuals when the need for additional data becomes apparent during demonstration or instruction.

.5 Correct deficiencies and defects identified during demonstration, instruction, or commissioning.

.6 Attend 'end-of-work' testing and break-in or start-up demonstration.

PART 2 - PRODUCTS
Not applicable.

PART 3 - EXECUTION
Not applicable.

END OF SECTION

PART 1 - GENERAL

1.1 Section Overview

.1 Work in this Section includes, but is not limited to, requirements for Indoor Air Quality (IAQ) Management during construction, which forms the Contractor's commitment for LEED® Credits EQc3 Construction IAQ Management Plan and EQc4 Indoor IAQ Assessment as follows:

.1 Contractor's responsibilities for development and implementation of an IAQ Management Plan.

.2 Contractor's responsibilities to confirm compliance with IAQ Management Plan before building occupancy by testing air quality or providing a building flush using 100% fresh air.

1.2 Related Sections

.1 01 33 29 General LEED® Requirements

1.3 References

.1 **American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE):** ANSI/ASHRAE 52.2-2010 Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

.2 **American Society for Testing and Materials (ASTM):**

.1 ASTM D5197–09e1 Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology).

.2 ASTM D5149–02(2008) Standard Test Method for Ozone in the Atmosphere: Continuous Measurement by Ethylene Chemiluminescence.

.3 **California Department of Public Health**, Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers, v1.1–2010.

.4 ISO - International Organization for Standardization

.1 ISO 16000-3, Indoor air–Part 3: Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air—Active sampling.

.2 ISO 16000-6, Indoor air–Part 6: Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA sorbent, thermal desorption and gas chromatography using MS or MS-FID.

.3 ISO 4224 Ambient air—Determination of carbon monoxide—Nondispersive infrared spectrometric method.

.4 ISO 7708 Air quality—Particle size fraction definitions for health-related sampling.

.5 ISO 13964 Air quality—Determination of ozone in ambient air—Ultraviolet photometric method.

.5 **Sheet Metal and Air Conditioning Contractors National Association (SMACNA):** SMACNA IAQ Guidelines for Occupied Buildings under Construction 2nd Edition 2007, ANSI/ SMACNA 008-2008 (Chapter 3)

.6 U.S. EPA United States Environmental Protection Agency

.1 U.S. EPA Compendium of Methods for the Determination of Air Pollutants in Indoor Air, IP-1: Volatile Organic Compounds, IP-3: Carbon Monoxide and Carbon Dioxide, IP-6: Formaldehyde and other aldehydes/ketones, IP-10 Volatile Organic Compounds

.2 U.S. EPA Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air, TO-1: Volatile Organic Compounds, TO-11: Formaldehyde, TO-15: Volatile Organic Compounds, TO-17: Volatile Organic Compounds.

.7 U.S. Green Building Council: Indoor Environmental Quality Credit 3: Construction IAQ Management Plan. LEED - Reference Guide for Building Design and Construction v4 http://www.usgbc.org

1.4 General

.1 Meet or exceed the recommended Design Approaches of the Sheet Metal and Air Conditioning Contractors National Association 2nd Edition 2007, ANSI / SMACNA 008-2008, Chapter 3.

.2 Protect construction workers and future building occupants from indoor air quality problems resulting from construction activities.

.3 Reduce the production and circulation of pollutants during construction.

.4 Protect equipment and absorptive materials stored and installed on-site from moisture, dust and dirt accumulation during construction.

.5 Prepare the building for occupancy following construction and prior to occupancy.

1.5 Description of Work

.1 A LEED Coordinator (site superintendent or other individual designated by the Contractor) shall be responsible for coordinating all aspects of LEED coordination (during construction) related to construction waste management and disposal

.2 Indoor Air Quality Management activities shall include:

.1 Identifying, implementing and documenting measures to achieve the indoor air quality management objectives

.2 Supervising on-site indoor air quality management activities on a daily basis

.3 Coordinating indoor air quality management tasks with subcontractors to ensure timely and orderly progress of the work

.4 Conducting indoor air quality management inspections and making necessary repairs

.5 Maintaining an indoor air quality inspection log to document observations, deficiencies and corrective actions

.6 Preparing indoor air quality management documentation and submittals as detailed herein

.7 Reporting indoor air quality management progress to the Contract Administrator

1.6 Submittals

.1 Submit an Indoor Air Quality Management Plan to the Contract Administrator for approval a minimum of 14 days prior to construction. The plan shall include the following:

.1 Specify procedures for protecting stored and installed absorptive materials from moisture damage.

.2 Highlight the non-smoking policy. Prohibit the use of smoking inside the building and within 7.5 meters, or more if required by the local jurisdiction, of the building entrance at all times.

.3 Confirm if air handlers will be operated during construction, and specify compliant filtration procedures for permanent equipment that will be used if operated.

.4 Outline approach to all five SMACNA Guidelines and measures that will be in place to ensure guidelines are met.

.1 HVAC Protection

.2 Source Control

.3 Pathway Interruption

.4 Housekeeping

.5 Scheduling

.5 Building flush-out and/or indoor air quality testing procedures prior to occupancy.

.6 Inspections and reporting procedures.

.2 Submit completed Schedule I1 – Indoor Air Quality Inspection Log on a monthly basis.

.1 Inspections shall commence when building is enclosed or duct work installation starts and carry through to building turnover.

.2 The inspection log shall be completed for each weekly inspection and document:

.1 Indoor air quality management measures implemented on site

.2 Condition of each measure

.3 Deficiencies and corrective actions taken to remedy the deficiencies

.4 Three different photos are to be provided for each measure listed on the inspection log.

.5 Photos are to be provided in .jpeg format

.6 Photos are to be date stamped, indicating Year, Month, and Day

.3 Submit completed inspection logs to the Contract Administrator on a monthly basis.

PART 2 - PRODUCTS

2.1 Filtration Media Requirements

.1 Air filter minimum efficiency reporting value (MERV) rating shall be determined by ASHRAE 52.2-2017

.2 If air handling equipment is used during construction, install MERV 8 (or higher) filters

.3 Prior to flush-out and prior to occupancy, install new MERV 13 filters in all air handling equipment

PART 3 - EXECUTION

3.1 Indoor Air Quality Management Plan Implementation

.1 Develop and implement an Indoor Air Quality Plan in accordance with Submittals section 1.7.1 above, including the five SMACNA Indoor Air Quality Management Practices as follows:

.1 Source Control

.1 Identify potential sources of indoor air pollutants on construction site.

.1 Any construction activity or material producing odour and/or dust is considered a source of air pollutant. Pollutant sources include but are not limited to:

Odour Emitting Products	Dust Creating Products
Paints	Concrete
Caulking	Insulation
Stain	Acoustic
Fuels	Ceiling Tile
Sealants	Wood Products
Grouts	Gypsum Board
Pesticides	Ceramic Tile
Epoxy Flooring	
Coatings	
Solvents	
Adhesives	
Cleaning Products	
Combustion/Odour Emitting Equipment	**Pollutant Disrupting Activities**
Generators	Demolition
Vehicles	Repair
Torches / Welders	Renovation
Soldering Guns	Exterior Site Work

Compressors Portable Heaters	Standing Water Tobacco Smoke

.2 Minimize pollutants generated inside building from sources identified in 3.1 using following measures:

.1 Prohibiting the use of tobacco products (smoking, e-cigarettes, chewing tobacco, etc.) inside building and within 7.5m of all building entrances at all times during construction

.2 Fueling up equipment outside building

.3 Storing gasoline or solvents outside building

.4 Restricting outdoor vehicular/equipment traffic and operation where emissions can enter building

.5 Reducing on-site emissions by using equipment that burns propane/natural gas or is powered by electricity

.6 Exhausting pollutant sources directly outside using temporary or permanent ventilation equipment. Where exhaust is not feasible, locally re-circulate air through a portable air cleaner

.7 Collecting and bagging sawdust from woodworking tools

.8 Covering and/or sealing indoor sources of odour and dust

.9 Using painting techniques minimizing odour (e.g roller instead of spraying)

.10 Using cleaning practices minimizing dust (e.g. vacuum instead of sweeping)

.11 Using cleaning Products minimizing pollution, fumes, VOC’s, etc.

.2 Pathway Interruption

.1 Prevent movement of pollutants from sources identified under “Pollutant Source Identification” to other areas in building using following measures:

.2 When possible, perform pollutant generating activities outside building

.3 Move equipment, work and other pollutant sources to locations where they will have minimum impact on indoor air quality

.4 Setup small, contained, designated work areas to contain pollutants

.5 Avoid open areas and areas with high drafts

.6 Erect dust curtains and barriers

.7 Depressurize areas using temporary or permanent ventilation equipment.

.8 Use portable fans to exhaust pollutants (e.g. gas engine exhaust) to exterior through windows, doors, etc. Ensure adjacent windows, doors, etc. will not allow pollutants to re-enter building

.9 Close windows and doors adjacent to pollutant sources (e.g. dust, vehicle emissions, etc.) outside of building. If windows and doors have not been installed, temporarily seal exterior openings with plastic, wood, etc.

.10 Pressurize occupied or completed areas of building using temporary or permanent ventilation equipment

.11 Prohibiting burning of garbage.

.3 Housekeeping

.1 Prevent accumulation of moisture, dust and dirt in building from sources identified under “Pollutant Source Identification” using following measures:

.2 Frequently cleaning interior surfaces to minimize dust and dirt accumulation by:

.1 Dusting with damp rags

.2 Wet mopping

.3 Sweeping using wetting agents and sweeping compounds

.4 Vacuuming with equipment containing HEPA filtration and/or a wet scrubber

.3 Localized cleaning should occur immediately after a construction activity is completed and/or at end of each Day. Perform a full building clean-up at least once a week.

.4 Close exterior windows and doors or create temporary enclosures using plastic or wood to prevent moisture accumulation indoors.

.5 Immediately remove any water accumulated indoors to protect interior surfaces and materials.

.6 Cover, seal and protect materials stored and installed on-site from moisture, dust and dirt accumulation.

.7 Elevate materials stored on-site off ground to protect from moisture and dirt accumulation.

.8 Do not install materials with evidence of moisture damage or excessive moisture accumulation.

.9 If necessary, use ventilation/dehumidification to control humidity levels within the building.

.10 Promptly clean spills (fuels, lubricants, paints, adhesives, etc.).

.11 Clean or remove excess application of solvent-containing Products.

.4 HVAC Protection

.1 Before and during Installation:

.1 Cover (with plastic) and elevate (off ground) ductwork, fittings, insulation, acoustic lining and equipment stored on site during construction.

.2 Seal supply, return and exhaust openings as well as temporary ductwork openings not under immediate work (e.g. open ends in ductwork runs) with plastic. Seal openings immediately after installation in areas that will no longer be under work.

.3 Close or cover hatches and access doors in HVAC equipment that will not be under work.

.4 Seal HVAC equipment openings (e.g. inlets or outlets of air handlers, fans, VAV boxes, etc.) with plastic until ductwork is connected.

.5 Do not use mechanical rooms to store or collect construction waste materials.

.6 Install ceiling tiles and seal openings into plenum with plastic prior to final cleaning.

.2 After Installation (select Option 1 or Option 2 for each HVAC system):

.1 Option 1: HVAC Equipment Not Used During Construction (Recommended):

.1 Do not operate any permanent HVAC equipment or systems during construction.

.2 Seal openings in HVAC systems, ductwork and plenums.

.3 If HVAC system protection measures are not implemented, or if system is operated during construction, Contractor must provide duct cleaning services, plus necessary access doors, at no extra cost to Contract.

.4 After construction and final cleaning work is complete Contractor shall:

.5 Remove HVAC protection measures.

.6 Install new filters in air handling equipment.

.7 Start-up systems.

.8 Prepare systems for Testing, Adjusting and Balancing Contractor and Commissioning Agent.

.2 Option 2: HVAC Equipment Used During Construction:

.1 Install new filters in air handling equipment before any HVAC system is operated. Provide a duct-mounted filter (external to equipment) if necessary.

.2 Install new filters with a minimum efficiency reporting value (MERV) of 8 at each return air grille and return or transfer duct inlet opening such that there is no bypass around the filtration media.

.3 Temporarily shut down return and exhaust side of HVAC systems during heavy construction or demolition.

.4 Permanently close off return and exhaust side of HVAC systems in areas with high dust levels. Cover duct openings with plastic in these areas.

.5 If HVAC system is operated without above protection measures in place, Contractor must provide duct cleaning services, plus necessary access doors, at no extra cost to Contract.

.3 After construction and final cleaning work is complete Contractor shall:

.1 Remove HVAC protection measures.

.2 Start-up systems.

.3 Prepare systems for Testing, Adjusting and Balancing Contractor and Commissioning Agent

.4 Immediately before occupancy, replace all filtration media with the final design filtration media.

.5 Scheduling

.1 Schedule construction activities to minimize amount of VOC's, odours and fumes absorbed by porous materials (e.g. ceiling tiles, carpet, etc.).

.2 Complete applications of wet and odorous materials such as paints, sealants and coatings before installing absorbent "sink" materials such as ceiling tiles, carpets and fabric-covered furnishings.

.3 Store fuels

.4 Allow for Testing, Adjusting and Balancing to be carried out following construction and before occupancy (refer to HVAC Protection Measures).

.5 Allow for corrective work related to general deficiencies, Testing, Adjusting and Balancing, and Commissioning to be carried out following construction and before occupancy.

.6 Inspections and Maintenance

.1 Inspect indoor air quality management measures and remedy any deficiencies on a weekly basis.

.2 Record inspections in I1 (1.5.2) IAQ Management Inspection Log and denote measures implemented at time of inspection, any deficiencies as well as corrective actions taken

.3 Provide photos as specified by I2 (1.5.3) Photo Documentation Checklist) at various occasions during construction to prove continuous compliance

.4 Pollutant containment, housekeeping and HVAC protection measures will be reviewed by the Contract Administrator during each site visit

.5 Deficiencies identified by Contract Administrator must be remedied and documented in I1 (1.5.2) IAQ Management Inspection Log within 48 hours of notification

.6 Clean or replace any equipment or materials incorrectly stored or improperly protected at no extra cost to Contract.

3.2 Indoor Air Quality Assessment

.1 Conduct indoor air quality testing prior to occupancy

.1 Indoor air quality testing will be carried out by the Contractor through the Cash Allowance.

.1 IAQ testing prior to occupancy may be replaced by building flush-out prior to occupancy or building flush-out overlapping with occupancy as determined by the contractor and City.

.2 The Contractor shall allow 3 days after all construction and final cleaning work is complete and prior to building occupancy for the testing agency to conduct indoor air quality testing.

.3 The Contractor shall perform all corrective work related to general deficiencies, Testing, Adjusting and Balancing, and Commissioning prior to indoor air quality testing.

.4 In order for IAQ Testing to be deemed complete, the test results must demonstrate that the air samples taken at all required locations are not above the limits established in the table below:

Contaminant	Maximum Concentration	Allowed Test Methods
Carbon Monoxide (CO)	9 part per million; and no greater than 2 parts per million above outdoor levels	ISO 4224 EPA Compendium Method IP-3 GB/T 18883-2002 for projects in China Direct calibrated electrochemical instrument with accuracy of (+/- 2% ppm <50 ppm minimum accuracy).
Particulates (PM10):	ISO 14644-1:2015, cleanroom class of 8 or lower 50 micrograms per cubic meter	Particulate monitoring device with accuracy greater of 5 micrograms/m3 or 20% of reading and resolution (5 min average data) +/- 5 µg/m3
Particulates (PM2.5):	35 micrograms per cubic meter 12 micrograms per cubic meter	
Ozone	0.07 parts per million	Monitoring device with accuracy greater of 5 ppb or 20% of reading and resolution (5 min average data) +/- 5 ppb ISO 13964 ASTM D5149 - 02 EPA designated methods for Ozone

.5 All testing shall be carried out according to the requirements published in the Canada Green Building Council: Indoor Environmental Quality Credit 4: Indoor Air Quality Assessment

.6 The number of test locations required shall be determined according to the requirements published in the Canada Green Building Council: Indoor Environmental Quality Credit 4: Indoor Air Quality Assessment.

.7 In the event that the test results exceed the limits established in the table above, the Contractor is responsible for taking remedial actions as recommended by the Contract Administrator or testing agent and for scheduling and retesting for any contaminant concentrations that were exceeded. This process shall be repeated until all requirements have been met.

.8 Upon successful completion of IAQ testing, the Contractor must provide the Contract Administrator with a copy of the IAQ testing results indicating the locations

3.3 Removal of Protection Measures

.1 Remove Products/materials installed as a part of indoor air quality management measures prior to building turnover. Any remedial work required as a result of removing measures is responsibility of Contractor.

END OF SECTION

Schedule I1 Indoor Air Quality Inspection Log

Complete weekly, submit to Contract Administrator monthly. Include three photo references for each measure listed (as applicable), photos are to be date stamped and submitted to the Contract Administrator as .jpeg files.

Company Name:		Inspection Date:	

IIAQ Inspection

Control Measure	Inspected	Condition	Notes / Corrective Action Taken	Photo Reference (attached as .jpeg)		
HVAC Protection						
All stockpiled HVAC equipment is stored on skids and sealed/covered to prevent dust accumulation.	☐ Yes ☐ N/A	Choose an item.				
All installed open duct ends are sealed. Ducts with excessive dust accumulation will be cleaned prior to occupancy.	☐ Yes ☐ N/A	Choose an item.				
All installed registers, diffusers, and returns are sealed.	☐ Yes ☐ N/A	Choose an item.				
Materials are not stored in mechanical rooms.	☐ Yes ☐ N/A	Choose an item.				
MERV 8 filters are installed when HVAC is running (as applicable).	☐ Yes ☐ N/A	Choose an item.				
Source Control						
Low-VOC materials are used, wet-applied materials are kept sealed when not in use.	☐ Yes ☐ N/A	Choose an item.				
Exhaust fumes (idling vehicles, equipment, etc.) are prevented from entering the building.	☐ Yes ☐ N/A	Choose an item.				
Stockpiled and installed materials are protected from moisture.	☐ Yes ☐ N/A	Choose an item.				
Materials that have been exposed to moisture have been replaced to prevent mould.	☐ Yes ☐ N/A	Choose an item.				
Pathway Interruption						
Designated cutting rooms are used to contain dust.	☐ Yes ☐ N/A	Choose an item.				
Dust guards and collectors used on tools.	☐ Yes ☐ N/A	Choose an item.				
Finished areas are physically separated from areas with dust generating activates.	☐ Yes ☐ N/A	Choose an item.				

Schedule I1 Indoor Air Quality Inspection Log

Housekeeping						
General housekeeping conducted to maintain a clean site.	☐ Yes ☐ N/A	Choose an item.				
Wetting agents or dust compounds used for dust control. Vacuums with HEPA filters are used.	☐ Yes ☐ N/A	Choose an item.				
Coils, air filters, fans and ductwork kept clean.	☐ Yes ☐ N/A	Choose an item.				
Materials are kept organized.	☐ Yes ☐ N/A	Choose an item.				
Waste bins provided throughout the building for storage of construction waste. Waste is stored away from mechanical equipment.	☐ Yes ☐ N/A	Choose an item.				
Scheduling						
Absorptive materials installed after wet-applied materials have fully cured.	☐ Yes ☐ N/A	Choose an item.				
New HVAC filters installed before occupancy.	☐ Yes ☐ N/A	Choose an item.				
Smoking						
Tobacco products are prohibited inside the building and within 25ft (7.5m) of the building entrance at all times during construction. Signage posted.	☐ Yes ☐ N/A	Choose an item.				

Other Observations

I hereby certify that the information provided above is complete and correct

Name, Title

Phone Number

Signature

PART 1 – GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 General requirements relating to commissioning of project's components and systems, specifying general requirements to performance verification of components, equipment, sub-systems, systems, and integrated systems.

.2 Acronyms:

.1 Cx - Commissioning

.2 CxA - Commissioning Authority

.3 O&M - Operation and Maintenance

.4 CVF - Component Verification Form

.5 FT – Functional Test

.6 TAB - Testing, Adjusting and Balancing

1.2 GENERAL

.1 Commissioning is a formal, systematic process of ensuring that building systems perform interactively according to the design intent and the City’s operational needs.

.2 Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:

.1 Applicable equipment and systems are installed according to the manufacturer’s recommendations and to industry accepted standards and that they receive adequate operational checkout by installing subcontractors.

.2 Proper performance of equipment and systems is documented.

.3 O&M documentation left on site is complete.

.4 City’s operating personnel are adequately trained.

.3 The Contractor is responsible for demonstrating equipment and systems, troubleshooting and making adjustments as required to the satisfaction of the CxA.

.1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively tested with each other as intended in accordance with Contract Documents and design criteria.

.2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.

1.3 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

.1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, the Contractor shall correct deficiencies, re-verify equipment and components within the non-functional system, including related systems as deemed required by the CxA and/or related design authority, to ensure effective performance.

.2 Contractor costs for corrective work, additional tests, and inspections to ensure proper performance of such items to be borne by Contractor.

.3 Contractor shall pay for CxA labour associated with excessive retesting of systems.

1.4 COORDINATION

.1 The following are members of the commissioning team:

.1 City Representative

.2 Commissioning Authority (CxA)

.3 Project Manager

.4 Contract Administrator (Prime Consultant all sub disciplines)

.5 Contractor

.6 Mechanical subcontractor

.7 Electrical subcontractor

.8 TAB representative

.9 Controls subcontractor

.10 Any other installing subcontractors or suppliers of equipment.

1.5 CONFLICTS (BETWEEN SPECIFICATION SECTIONS)

.1 Report conflicts between requirements of this section and other specification sections to the Contractor before start-up and obtain clarification.

.2 Failure to report conflict and obtain clarification (through RFI process) will result in application of the design authority's intent on the issue.

1.6 COMMISSIONING SCHEDULE

.1 The Contractor will provide Cx schedule to CxA for review and comment.

.2 The Contractor will provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:

.1 Commissioning site visits

.2 Component verification completion

.3 Startup and pre-functional testing activities

.4 Functional testing dates

.5 City training

.6 Seasonal or deferred testing.

.7 10-Month occupancy review

.8 22-month occupancy review (year 2 seasonal review)

.3 All parties are responsible to address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

1.7 SYSTEMS TO BE COMMISSIONED

.1 The following systems will be commissioned for this project (if applicable):

Electrical

Lighting and Lighting Controls

Electric Heaters

Distribution

Plumbing

Domestic hot water heaters

Recirculation pumps

Sump Pumps

HVAC

Energy Recovery Ventilators

Air Handling Units

Fan Coil Units

VAV Terminal Units

Heating coils

Exhaust fans

Condensing Units

Split AC units

Boilers

Water to water heat pumps

Pumps

Testing, Adjusting and Balancing Work

Direct Digital Controls (DDC)

Central Building Automation System

1.8 MEETINGS

.1 Commissioning Kickoff Meeting. The CxA will schedule, plan and conduct a commissioning scoping meeting with the entire commissioning team in attendance.

.2 Miscellaneous Meetings. Other meetings will be planned and conducted by the CxA at the discretion of the CxA as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with Contractor and subcontractors.

1.9 SUBMITTALS (SHOP DRAWINGS)

.1 The CxA requires submittal documentation for facilitating the commissioning work. These requests will be integrated into the normal submittal process and protocol of the construction team.

.2 These submittals to the CxA do not constitute compliance for O&M manual documentation. The O&M manuals are the responsibility of the Contractor, though the CxA will review them and provide feedback, where in the opinion of the CxA, correction is required. O&M manuals must be submitted in electronic (pdf) format.

1.10 COMPONENT VERIFICATION FORM CHECKLISTS and INITIAL CHECKOUT

.1 The following procedures apply to all equipment to be commissioned (see Section 1.7 for list of equipment and systems).

.2 Component Verification Forms (CVF). CVF checklists document that the equipment and systems are installed as per the design intent and good practice. Component Verification Forms for a given system must be successfully completed prior to functional testing.

.1 CVFs will be developed in an electronic format (pdf) by the CxA and electronic copies will be provided to the Contractor. The Contractor and subcontractors are responsible to execute and document the CVF checklist on site, and return to the CxA for inclusion in the final report. The CxA will verify the installation and accuracy of the CVFs using an audit process.

.2 CVFs are used to track and document that the proper equipment has been specified, submitted and installed. The forms capture typical maintenance information such as tag #, model, service, location, nameplate data, static submittal data, etc.

.3 A Sample CVF has been attached (Section 1.11) for bid purposes.

.3 Issues identified during commissioning inspections will be documented by the CxA on the issue tracking log.

.1 Contractor and subcontractors shall respond to issues and ensure correction.

REMAINDER OF PAGE LEFT INTENTIONALLY BLANK

1.11 SAMPLE COMPONENT VERIFICATION FORM

Project Name — Component Verification Form

Owner
City, Province

Unit Tag: **AHU-#**
Equipment Type: Air Handling Unit
System: HVAC
Location: Rooftop
Area Serviced: East Wing

This box for CKP use only.
CxA reviewer: _____
Form Audited? YES ☐ NO ☐

Signature	Contractor (include company and print name)	Date
Mechanical:		
Electrical:		
Controls:		
General:		

CKP Audit Verification

Nameplate Data	IFC Schedule	Approved Submittal *note any changes*	Installed *note any changes*	Installer Verify	CKP Audit Verification
Manufacturer	AHU Maker			☐	☐
Model	AHU 12AB-24CD			☐	☐
DX Cooling Coil Model	CC-101			☐	☐
Total Cooling Capacity (MBH)	2500			☐	☐
Hot Water Coil Model	HW-102			☐	☐
Heating Capacity (MBH)	2500			☐	☐
Supply Fan Motor (HP)	5			☐	☐
Return Fan Motor (HP)	5			☐	☐
Electrical [V/Ph/Hz]	575/3/60			☐	☐

Details/Notes:
Sample AHU

Inspection Items	Comments	Installer Verify	CKP Audit Verification
General Installation & Cleanliness			
Equipment is clean and free of debris		☐	☐
Equipment is properly mounted and vibration isolation equipment is installed on motors		☐	☐
Service hatches & filter access is not hindered by surrounding equipment		☐	☐
Record the MERV rating of the filters in the unit		☐	☐
Shipping mounts are removed		☐	☐
Air filters installed correctly and clean		☐	☐
Duct Installation			
Duct layout matches drawings and duct connections are sealed		☐	☐
Smoke and fire dampers are properly installed according to contract documents		☐	☐
Piping/Coil Installation			
Hydronic piping and acessories installed		☐	☐
Piping is adequately supported		☐	☐
Condensate piping installed to floor drain		☐	☐
Coil has been combed with no visible damage		☐	☐
Electrical Installation			
Wiring complete and electrical connections are tight		☐	☐
Verify that overload breakers are installed and sized correctly		☐	☐
Local disconnects are installed and labelled		☐	☐
VFDs for fans installed per contract documents		☐	☐
Controls Installation			
Controls wiring complete and electical connections are tight		☐	☐

Date Printed: 2023-07-18

Page 1 of 2

Project Name		Component Verification Form	
Owner City, Province	Unit Tag: **AHU-#** Equipment Type: Air Handling Unit System: HVAC Location: Rooftop Area Serviced: East Wing		
Control actuator and sensor locations match contract documents		☐	☐
Control actuators and sensors labelled/tagged per contract documents		☐	☐
Insulation & Labelling			
Thermal Insulation complete as per contract documents		☐	☐
Unit is correctly labelled		☐	☐
Ducts and piping are labelled per contract documents and direction of flow is indicated		☐	☐
Startup			
Manufacturer startup report completed and provided		☐	☐
VFD startup report completed and provided		☐	☐
Verify fan rotation		☐	☐

1.12 SYSTEM START-UP

.1 Start-up Plan. The Contractor will provide a detailed startup plan for all commissioned equipment for review by the CxA.

.2 The startup plan will include blank startups forms (provided by manufacturer, or otherwise) for commissioned systems.

.1 The CxA may attend startups at their discretion to ensure that startup documentation and procedures are being followed as required.

.2 The Contractor, subcontractors, and vendors shall execute start-up.

.3 Provide the CxA with a signed and dated copy of the completed start-up report.

.3 Start-up documentation to include:

.1 Factory and on-site test certificates for specified equipment.

.2 Pre-start-up inspection reports.

.3 Signed installation/start-up check lists.

.4 Start-up reports,

.5 Step-by-step description of complete start-up procedures, to permit Contract Administrator to repeat start-up at any time.

.4 Submit required startup documentation including, but not limited to:

.1 Mechanical Systems

.1 Major equipment manufacturers startup reports (AHUs, Boilers, Heat Pumps, etc.)

.2 Piping pressure tests

.3 TAB report

.2 Electrical Systems

.1 Electrical equipment test reports (megger tests, harmonic distortion testing)

.2 Low voltage lighting system test report

.3 Fire Alarm verification report.

.3 Controls

.1 Control point end-to-end verification report

1.13 FUNCTIONAL TESTING

.1 Refer to Section 1.7 for the list of systems to be commissioned.

.2 Functional testing demonstrates that each system is operating according to the documented design intent and Contract documents. Each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part and full load). Verifying the sequences of operation is required for all modes. Proper responses to modes and conditions such as power failure, freeze conditions, fire alarm conditions, equipment failure, etc. may also be tested.

.3 Functional Tests will be developed in an electronic format (pdf) by the CxA and electronic copies will be provided to the Contractor.

.4 The CVFs for a given system's equipment must be completed prior to the functional test.

.5 The Contractor, subcontractor, and/or vendors shall execute the functional tests as a pre-functional test to verify correct system operation and provide the CxA with a signed and dated copy of the completed tests prior to formal functional testing with the CxA present.

.6 Issues identified during functional testing will be documented by the CxA on the issue tracking log.

.1 Contractor and subcontracotrs shall respond to issues and ensure correction.

.7 A Sample functional test has been attached (Section 1.14) for bid purposes.

REMAINDER OF PAGE LEFT INTENTIONALLY BLANK

1.14 SAMPLE FUNCTIONAL TEST

Project Name	Functional Testing Procedure
Project Owner	New Addition HVAC
Project Location	

New Addition HVAC

Components:
Air handling unit (AHU-#) consisting of supply and return fans with VFDs, a DX cooling coil and associated condenser, hydronic heating coil, filter section and motorized dampers, variable air volume terminal units (VAV-#), hydronic baseboards (BB-#)

Description:
AHU-# located on the rooftop provides ventilation and temperature control to the new addition. VAVs and perimeter baseboard heaters provide zone level temperature control. The system operates on an occupancy schedule. AHU discharge air temperature is reset based on the average room temperature and setpoint. Economizer damper modulates open to provide free cooling when OA conditions allow it or when CO2 levels rise above setpoint. The BMS monitors the operation of the system and generates alarms if required.

Notes:

	Test and Expectation	Remarks	Sign-Off
001	**Occupancy Schedule** The system operates based on an occupancy schedule. Verify user can adjust or override the schedule on the BMS.	Record occupancy schedule:	Date: Initials:
002	**Unoccupied Mode** Supply and return fans are disabled, outdoor air dampers are closed and return air damper is open. If any zone temperature drops below 13°C (adj.), AHU fans enable, motorized dampers remain in recirculation position (full return air) and unit operates in heating mode until the space temperatures rise above 15°C (adj.). Verify by adjusting schedule and heating setback temperature and operational check.		Date: Initials:
003	**Occupied Mode** Supply and return fans operate continuously. Verify by adjusting schedule and operational check.		Date: Initials:
004	**Supply Fan Control** Supply fan VFD modulates speed to maintain supply pressure setpoint, determined during air balancing. Verify by adjusting pressure setpoint and operational check.	Record pressure setpoint:	Date: Initials:
005	**Return Fan Control** Return fan VFD modulates speed to maintain building pressure at 5 Pa. Verify by adjusting pressure setpoint and operational check.		Date: Initials:
006	**Heating Mode** Heating mode enables when OAT<13°C. Glycol heating coil control valve modulates to maintain discharge air temperature setpoint. Setpoint is reset between 13°C and 22°C, based on average zone heating demand. Verify by adjusting setpoint and operational check.		Date: Initials:

	Test and Expectation	Remarks	Sign-Off
007	**Cooling Mode** Cooling mode enables when OAT>13°C. Factory installed controls modulate cooling output to maintain discharge air temperature setpoint. Setpoint is reset between 13°C and 22°C so that the most open VAV damper position is 90% (adj.) open. Verify by adjusting setpoint and operational check.		Date: Initials:
008	**Economizer Mode** Economizer mode enables when OAT≤13°C (adj.) and there is a call for cooling. Outdoor air, return air and relief air dampers modulate as required to maintain discharge air temperature setpoint. Economizer mode is locked out when the outdoor air enthalpy is greater the in the indoor air enthalpy. Verify by adjusting setpoint and operational check.		Date: Initials:
009	**Minimum OA Damper Position** Minimum outdoor air position determined during air balancing to maintain minimum ventilation requirements. Verify minimum OA damper position is set up in unit's control program.	Record minimum OA damper position:	Date: Initials:
010	**CO2 Control** The outside air damper modulates open from minimum position when required to maintain zone CO2 levels below setpoint 1000ppm (adj.). Relief air damper modulates to the same position and return air damper modulates opposite of the OA and relief damper positions. Adjust CO2 setpoint and verify motorized dampers response correctly.		Date: Initials:
011	**Classroom ## - VAV-#, BB-#**		
012	**Zone Temperature Control - Heating** VAV damper position remains constant to maintain design airflow (388 L/s). Hydronic baseboard heater 2-way control valve modulates to satisfy zone thermostat. Verify by adjusting setpoint and operational check.		Date: Initials:
013	**Zone Temperature Control - Cooling** VAV damper position modulates between minimum and maximum position to satisfy zone thermostat (156 to 637 L/s). Hydronic baseboard heater 2-way control valve remains closed. Verify by adjusting setpoint and operational check.		Date: Initials:
014	**Classroom ## & Corridor ## - VAV-#, BB-#**		

	Test and Expectation	Remarks	Sign-Off
015	**Zone Temperature Control - Heating** VAV damper position remains constant to maintain design airflow (467 L/s). Hydronic baseboard heater 2-way control valve modulates to satisfy zone thermostat. Verify by adjusting setpoint and operational check.		Date: Initials:
016	**Zone Temperature Control - Cooling** VAV damper position modulates between minimum and maximum position to satisfy zone thermostat (187 to 637 L/s). Hydronic baseboard heater 2-way control valve remains closed. Verify by adjusting setpoint and operational check.		Date: Initials:
017	**Alarms: Supply Fan Failure** Verify alarm at the operator interface for supply fan failure and shut down return fan.		Date: Initials:
018	**Alarms: Return Fan Failure** Verify alarm at the operator interface for return fan failure and shut down supply fan.		Date: Initials:
019	**Alarms: Low Supply Air Temperature** Verify alarm at the operator interface for non-critical low supply air temperature.	Record low limit:	Date: Initials:
020	**Alarms: Dirty Filter** Verify alarm at the operator interface for dirty filter alarm. Record differential pressure setpoint for a dirty filter.		Date: Initials:
021	**Alarms: High CO2 levels** Verify alarm at the operator interface for high space CO2 levels (10% above setpoint).		Date: Initials:
022	**Operator Interface Graphics and Trends** Verify the operator interface accurately represents the installed system. The following points are displayed and trended: - AHU supply air temperature and setpoint - Return air temperature - Mixed air temperature - Supply duct pressure and setpoint - Building pressure - Supply fan command, status and speed - Return fan command, status and speed - Zone temperature and setpoint (x2) - Hydronic control valve positions (x2) - VAV damper position (x2) - Zone CO2 level (x2)		Date: Initials:
023	**Operation Meets Generally Accepted Good Practice** Record any discrepancies noted during testing and operation of the system.		Date: Initials:

1.15 SEVEN (7) DAY INTEGRATED SYSTEM TESTING

.1 A 7-Day Integrated Systems Test will be completed to ensure proper building performance and operation. An additional test will be completed during seasonal testing.

.2 General Acceptance requires that the systems operate as one entity as intended and that documentation is provided indicating such.

.3 Issues identified during seven day testing will be documented by the CxA on the issue tracking log.

.1 Contractor and subcontractors shall respond to issues and ensure correction.

1.16 DEFERRED/SEASONAL TESTING

.1 Functional tests requiring specific environmental conditions (seasonal tests) will be deferred until after occupancy

.2 The Contractor, subcontractors, and/or vendors shall execute the deferred/seasonal tests as a pre-functional test to verify correct system operation and provide the CxA with a signed and dated copy of the completed tests prior to formal functional testing with the CxA present.

.3 Issues identified during deferred/seasonal testing will be documented by the CxA on the issue tracking log.

.1 Contractor and subcontractors shall respond to issues and ensure correction.

1.17 ISSUE TRACKING LOG

.1 Contractor and subcontractors shall respond to issues noted on the issue tracking log within 7 days indicating the corrective action taken.

.2 CxA may request the contractor or subcontractors demonstrate successful resolution of items noted on the tracking log.

1.18 CITY TRAINING

.1 The Contractor is responsible for training of O & M staff to ensure they have all information necessary to operate and maintain commissioned features and systems.

.2 Submit a training plan and schedule to CxA for review.

.3 Training plan will address the following topics (at a minimum)

.1 Design intent

.2 Use of Operations and Maintenance (O&M) Manuals

.3 Control Drawings and Schematics

.4 Startup and Shutdown

.5 Unoccupied operations

.6 Seasonal changeover

.7 Manual operations

.8 Alarms

.9 System interactions

.10 Energy conservation optimizations

.11 Health and safety

.12 Special maintenance or replacement

.13 Occupant interaction

.14 Systems response to operating conditions

.15 Contractor shall document training sessions with attendance sheets.

.16 A training evaluation form has been attached (Section 1.19) for bid purposes.

REMAINDER OF PAGE LEFT INTENTIONALLY BLANK

1.19 SAMPLE TRAINING EVALUATION FORM

CrosierKilgour

Owner Training Survey
Project Number: "[Click here and type]"
"[Click here and type date]"

[Project Name]
[Location]

Owner Training Survey

Date:

Name:

Training Covered:

1. Was the Instructor familiar with the equipment? **Yes ☐ No ☐**

2. Was the topic covered completely? **Yes ☐ No ☐**

3. Were your questions answered? **Yes ☐ No ☐**
(if No, list questions?)

4. Overall, are you satisfied? **Yes ☐ No ☐**
Comments

1.20 SYSTEMS MANUAL

.1 Contractor to provide the following documentation to the CxA for inclusion in the systems manual:

.1 As-built architectural drawings (electronic copy)

.2 As-built mechanical drawings (electronic copy)

.3 As-built electrical drawings (electronic copy)

.4 As-built controls drawings and cut sheets (electronic copy)

.5 Operations and Maintenance manuals (electronic copy)

.6 Occupancy and building permits.

1.21 AUTHORITIES HAVING JURISDICTION (I.E. GOVERNMENT AND UTILITY AUTHORITIES)

.1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for CxA to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.

.2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.

.3 Provide copies to Contract Administrator and CxA within 5 days of test.

PART 2 PRODUCTS

2.1 Not used.

PART 3 EXECUTION

3.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Procedures for verifying and documenting that interconnections between systems provided for *integrated fire protection and life safety systems* functions are installed and operating in conformance with their *design criteria* and in accordance with CAN/ULC S1001-11.

.2 This specification is limited to testing of the interconnections between life safety and fire protection systems. Refer to separate technical specification sections for the individual testing and commissioning requirements for those systems.

1.2 Administrative Requirements

.1 Definitions:

.1 Terms presented here in italic font are defined either in the general conditions and definitions of the contract, or in CAN/ULC S1001-11.

.2 The Contract Administrator shall be considered the *design professional* for the purposes of the Contract.

.2 Coordination:

.1 Coordinate the applicable Subcontractors whose equipment or systems are part of the *integrated fire protection and life safety systems test*.

.3 Conduct a pre-installation meeting in accordance with Section 01 31 19 and as follows:

.1 Attendees at pre-installation meeting shall include Subcontractors whose equipment or systems are part of the *integrated fire protection and life safety systems test*.

.2 Review requirements of authorities having jurisdiction, as well as requirements of, and roles and responsibilities for, each participant in the development of the *integrated test plan* and the execution of the *integrated fire protection and life safety systems test*.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 *Integrated test plan*:

.1 Develop the *integrated test plan* in accordance with Section 5 of CAN/ULC S1001-11.

.2 Submit the *integrated test plan* for review by the Contract Administrator at least 30 days prior to commencement of the first *integrated fire protection and life safety systems test*. The *integrated testing plan* shall comply with the requirements of CAN/ULC S1001-11 and as specified herein.

.3 Distribute final copy of plan digitally as follows:

.1 Authorities having jurisdiction.

.2 One copy to be maintained at the Site.

.3 City.

.4 Contract Administrator.

.5 Contractor.

.6 Consulting engineers, as applicable.

.3 Final test report:

.1 Upon successful completion of the *integrated fire protection and life safety systems tests*, submit a final test report in accordance with Section 7 of CAN/ULC S1001-11.

.2 Distribute reports digitally as follows:

.1 Authorities having jurisdiction.

.2 One copy to be maintained at the Site.

.3 City.

.4 Contract Administrator.

.5 Contractor.

.6 Consulting engineers, as applicable.

1.4 Quality Assurance

.1 *Integrated testing coordinator* qualifications:

.1 The *integrated testing coordinator* services shall be provided by a firm or individual certified under the CAN/ULC-S1001 Certification of Integrated Testing Service Providers program.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 Integrated Systems Testing Requirements

.1 Conduct *integrated fire protection and life safety systems* testing in accordance with Section 6 of CAN/ULC S1001-11 and the accepted *integrated testing plan*.

3.2 Demonstration and Training

.1 Conduct demonstration and training in accordance with Section 01 79 00.

.1 Demonstrate the operation of, and providing training on, the integration of *fire protection and life safety systems*.

.2 Demonstration and training to include:

.1 The function of the integration.

.2 The method of integration: hardwired, network communication, operating protocols.

.3 The type of information: data, commands, monitoring.

.4 Any temporary measures to be taken to retest in the future.

END OF SECTION

PART 1 - GENERAL

1.1 Definitions

.1 The following Definitions shall apply in this Specification:

.2 Contract Documents

.1 The Contract Documents consist of the Drawings, Specifications and Reports which form part of the agreed Contract.

.3 Contract Administrator

.1 The Contract Administrator is the Architect, SEOR, persons or entities engaged by the City. The term Contract Administrator means the Contract Administrator or the Contract Administrator's authorized representative.

.4 Contractor

.1 The term Contractor is defined to include any of the following: Construction Manager, General Contractor, Structural Steel Erector, Structural Steel Fabricator, Subcontractor or Supplier.

.5 City

.1 The City is the person or entity identified as such in the Contract. The term City means the City or the City's authorized agent or representative but does not include the Contract Administrator.

.6 SEOR

.1 The SEOR is defined as the Structural Engineer of Record for the Contract.

1.2 Work Included

.1 Comply with Division 1 - General Requirements and all documents referred to therein.

.2 Provide all labour, materials, plant and equipment to complete the concrete formwork and falsework indicated in the Contract Documents, including the installation of cast in inserts and assemblies as therein.

1.3 Section Includes

.1 This Section includes: concrete formwork, falsework, void forms,separation strips, and qualification requirements.

1.4 Related Work Specified Elsewhere

.1 Section 03 20 00 - Concrete Reinforcement: Concrete Reinforcement.

.2 Section 03 30 00 - Cast-in-Place Concrete: Cast-in-Place Concrete.

.3 Section 05 12 00 - Structural Steel: Anchor assemblies, bolts and the like to be cast into concrete.

1.5 Reference Standards, Codes, And Acts

.1 Conform to the requirements of the local building code identified on the Structural General Notes as amended by all subsequent Regulations issued to the date of this specification and applicable acts of authorities having jurisdiction.

.2 All references to the Standards and publications noted below shall be to the edition referenced in the local building code identified on the Structural General Notes, or to the edition referenced in the latest published editions or revisions of all Standards published by the Canadian Standards Association issued to the date of this Specification, whichever is the later edition or revision.

.3 All references noted below, which are not referenced by the local building code or the Standards published by the Canadian Standards Association, shall be to the latest edition and revision published to the date of this Specification.

.4 Standards and publications referenced by the Standards noted below shall apply even if they are not included in the list. Where such reference is made, it shall be to that latest edition and revision published to the date of this Specification.

.5 Where there are differences between the Contract Documents and the codes, standards or acts, the most stringent shall govern.

.6 CAN/CSA B242 - Groove- and Shoulder-Type Mechanical Pipe Couplings.

.7 CAN/CSA O86 - Engineering Design in Wood.

.8 CAN/CSA S269.3 - Concrete Formwork.

.9 CSA A23.1/A23.2 - Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete.

.10 CSA O325 - Construction Sheathing (Adopted NIST PS 2-18 , with Canadian Deviations).

.11 CSA S269.1 - Falsework and Formwork.

.12 OPSS 1308 - Ontario Provincial Standard Specification for Joint Filler in Concrete.

1.6 Tolerances

.1 Perform forming operations and place hardware so that finished concrete will be within the tolerances set out in CSA A23.1/A23.2

.2 Variations in building lines which result in extension of the building over lot lines or restriction lines will not be permitted.

.3 These tolerances are acceptable with regard to structural requirements. Interfacing tolerances may not be compatible with the above. Review and coordinate interfacing tolerances so that the various elements come together properly.

1.7 Qualifications

.1 The formwork, falsework, and reshoring shall be designed by a qualified professional engineer licensed by the authority having jurisdiction with a minimum of 5 years Canadian experience in the design of such temporary construction Work.

1.8 Design

.1 Formwork, falsework, and Reshoring.

.1 The Contractor shall design formwork, falsework, and reshoring to safely support vertical and lateral loads until they can be supported by the structure.

.2 The Contractor shall design formwork, falsework, and reshoring for the effects of post-tensioning and shall ensure the design is coordinated with the post-tensioning designer.

.3 Design formwork to the requirements of CAN/CSA S269.3..

.4 Design falsework to the requirements of CSA S269.1.

1.9 Submittals

.1 Shop Drawings for Formwork, Falsework, and Reshoring

.1 Reproduction of the structural drawings, to serve as a basis for the preparation of shop drawings, will be permitted and is subject to a separate agreement between the Structural Engineer and the Contractor. Any costs associated with the preparation of the structural Drawings for use by the Contractor shall be paid for by the Contractor.

.2 Provide adequate space on all shop drawings immediately above the drawing title block for the Contract Administrator's Shop Drawing review stamp. Where requested by the Contract Administrator, the stamp is to be inserted by this section directly into the shop drawing prior to submission. The stamp shall be positioned in the same location on each shop drawing, and in no case shall the allocated space be less than 63 mm x 75 mm. Request the details of these requirements from the Contract Administrator no less than 2 weeks before the commencement of shop drawings.

.3 Well in advance of construction, submit to the Contract Administrator shop drawings showing the complete design and detailing of the slab formwork, falsework, and reshoring systems stamped by a qualified professional engineer licensed by the authority having jurisdiction.

.4 As a minimum, the shop drawings shall show the following:

.1 All design assumptions including references to the relevant codes, standards and sets, design loads, assumed concrete placing rate and the like.

.2 Construction Joints

.1 Well in advance of construction, submit to the Contract Administrator shop drawings showing the location of all horizontal and vertical construction joints in the structure. Drawings shall include plans, wall elevations and additional sections and details (as necessary) which clearly indicate the proposed location of the joints. Drawings shall include dimensions for all construction joints to reference grid lines and elevations.

.2 Drawings shall include any specific provisions or requirements where the elements are noted to be poured monolithically on the Contract Documents.

.3 Honeycombed Concrete

.1 Submit a proposed method statement for the repair of honeycombed concrete, including a list of suitable products, for the following depths of honeycombing;

.1 Less than 20 mm;

.2 20 mm to 60 mm; and

.3 Greater than 60 mm.

.4 Lift Drawings

.1 Submit lift drawings of the structure showing, all cast-in or embedded items, openings, recesses and sleeving required by the Work of all Specification Sections, for the Contract Administrator's review. Drawings shall be submitted a minimum of 30 days prior to the commencement of the reinforcement detailing of the area outlined on the lift drawings.

.2 All embedded items, openings, sleeves and chases are not necessarily shown on the structural Drawings nor are their sizes or locations shown on the Drawings. Refer to architectural, mechanical and electrical Drawings and Specifications and the detailed shop drawings prepared for the Work of all Specification Sections for openings and sleeving requirements not shown, located and dimensioned on the structural Drawings.

.3 Openings, sleeves, chases embedded items and the like shall be fully dimensioned from gird lines in plan and floor levels in elevation. Information including sizes, dimensions, locations, elevations etc. shall be drawn to scale on a set of structural drawings.

.4 Openings and embedded items required for all aspects of the Work shall be shown and coordinated on a single set of lift drawings.

.5 Lift drawings are to be reviewed by the Contractor, prior to submission to the Contract Administrator.

.6 The Contractor's review stamp shall be affixed to all lift drawings that are submitted for review.

.5 As-Built Drawings

.1 Mark on a complete set of final drawings any changes, additions or deletions that occur during construction as a result of the Contractor's Work, change orders, or for any other reason.

.2 For all shop drawings marked “Reviewed as Noted” or “Revise and Resubmit”, update and submit a record set of these drawings at the completion of the structural Work. Ensure that these drawings reflect the changes and are coordinated with the final drawings noted above.

PART 2 - PRODUCTS

2.1 Materials

.1 Formwork

.1 Formwork lumber: Conform to CAN/CSA O86 and CSA O325.

.2 Falsework materials: Conform to CSA S269.1.

.3 Sheathings for exposed surfaces: New, Douglas Fir plywood not less than 19 mm thick, concrete form grade, sanded one side, conforming to CSA O325.

.4 Preformed Steel Forms: Minimum 1.6 mm (16 gauge) matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

.5 Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of the wet concrete mix until initial set.

.6 Corners: Chamfered as required architecturally, in maximum lengths possible.

.2 Waterstops

.1 Construction and Control Joints: Provide polyvinyl Chloride (PVC) waterstop Type 7 (internal type) or Base Seal Type 61 (external type) as manufactured by CPD Construction Products or an equivalent approved by the Contract Administrator.

.1 Construction Joints: Provide polyvinyl Chloride (PVC) waterstop Type GSK580 (internal type) as manufactured by Sika or Base Seal Type GSK776 (external type) as manufactured by Sika or an active bentonite/butyl-rubber based waterstop Type RX-101 by Cetco or an equivalent approved by the Contract Administrator.

.2 Control Joints: Provide polyvinyl Chloride (PVC) waterstop Type 5 (internal type_ as manufactured by CPD Construction Products or polyvinyl Chloride (PVC) waterstop Base Seal Type GSK923 (external type) as manufactured by Sika or an equivalent approved by the Contract Administrator.

.2 Construction and Control Joints: Provide bentonite waterstop RX-101 by Cetco or an equivalent approved by the Contract Administrator.

.3 Movement Joints: Provide polyvinyl Chloride (PVC) waterstop Type 7C (internal type) or Baseal Type 62 (external type) as manufactured by CPD Construction Products or an equivalent approved by the Contract Administrator.

.3 Dovetail anchor slots: Minimum 0.8 mm (22 gauge) galvanized steel with insulation filled slots.

.4 Flashing Reglets: Minimum 0.8 mm (22 gauge) thick galvanized steel with alignment splines for joints.

.5 Form Spacers: (Stay-in-place form spacers exposed to weather, earth, or moisture shall not be made of wood, and shall be corrosion and decay resistant.)

PART 3 - EXECUTION

3.1 Earth forms

.1 Earth forms are only permitted where shown on the Contract Documents.

.2 Hand trim sides and bottom of earth forms. Remove loose soil and water prior to placing concrete.

3.2 Formwork

.1 General

.1 Erect, support, brace, and maintain formwork to safely support vertical and lateral loads until they can be supported by the structure.

.2 All falsework erection shall be supervised by the professional engineer responsible for its design.

.3 All formwork shall be inspected by the Contractor and the professional engineer responsible for its design, prior to the concrete pour to ensure that they have been erected in conformance with the formwork shop drawings.

.4 Align joints in formwork and make water-tight. Keep form joints to a minimum.

.5 Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing prior to concreting.

.2 Construction

.1 Form footing sides unless footings are shown to be placed against undisturbed soil or rock in the Contract Documents or unless excavation is left with vertical sides against which the concrete can be directly cast.

.2 Mark building, grid or other lines on forms to permit the accurate positioning of dowels into concrete elements above and all other reinforcing steel.

.3 Construct templates and supports to rigidly fix reinforcing dowels in the forms prior to concreting.

.4 Set anchor rods, templates, steel connection units, hardware, and/or other inserts into the forms and secure them rigidly so that they do not become displaced during concreting.

.5 Application of Form Release Agent

.1 Apply form release agent in accordance with the manufacturer's recommendations.

.2 Apply prior to placement of reinforcement, anchoring devices, and embedded items.

.3 Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings, which are affected by the agent. Soak inside surface of untreated forms with clean water and keep surfaces covered prior to placement of concrete

.3 Sleeves, Recesses and Formed Openings

.1 Form sleeves, recesses and openings in accordance with reviewed sleeving drawings, except where such items are specified to be formed or sleeved by the appropriate Section in the Contract Documents.

.2 No sleeves, recesses, or openings through structural members shall be formed without the Contract Administrator's approval.

.3 During cold weather, protect members from damage due to water freezing in confined areas, recesses, sleeves or formed 'openings'.

3.3 Construction Joints

.1 Obtain approval from the Contract Administrator for location and details of construction joints not shown on the Contract Documents.

3.4 Movement Joints

.1 Construct movement joints at the locations indicated in the Documents and in accordance with the details shown in the Contract Documents.

.2 Construct clean movement joints free of foreign material, likely to impair the proper operation of the joint.

.3 Provide a non-extruding joint filler in movement joints for the full area between adjacent concrete members. Anchor the filler material to one of the adjacent members or between concrete members and adjacent members of other materials.

.4 Where shown in the Contract Documents, provide waterstops in movement joints.

3.5 Separation Strips

.1 Maintain bays containing separation strips and each adjacent bay fully formed and shored until the separation strip is complete, and has reached its 28 day specified strength. Ensure that the forms and shores are designed so that no settlement of the forms occurs during the period that the strip is open.

3.6 Waterstops

.1 Install waterstops in accordance with the manufacturer's requirements, to provide continuous water seal. Do not distort or pierce waterstop. Do not displace reinforcement when installing waterstops. Tie waterstops rigidly in place.

.2 Splice waterstops in accordance with the manufacturer's requirements.

.3 Where waterstops are noted to be installed adjacent to existing Work, prepare existing surfaces to receive waterstop in accordance with manufacturer's recommendations.

3.7 Quality Control

.1 Implement a system of quality control to ensure that the minimum standards specified in the Contract Documents are attained.

.2 Bring to the attention of the Contract Administrator any defects in the Work or departures from the Contract Documents which may occur during construction. The Contract Administrator will decide upon corrective action and give recommendations in writing.

.3 The Contract Administrator's general review during construction and inspection and testing by independent inspection and testing companies reporting to the Contract Administrator are both undertaken to inform the City of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve the Contractor of its contractual responsibility.

.4 Notification

.5 Prior to commencing significant segments of the Work, give the Contract Administrator and independent inspection and testing companies appropriate notification so as to afford them reasonable opportunity to review the Work. Failure to meet this requirement may be cause for the Contract Administrator to classify the Work as defective.

3.8 Inspection and testing

.1 The City or Contract Administrator will appoint an independent inspection and testing companies to make inspections or perform tests as the Contract Administrator directs. The independent inspection and testing companies shall be responsible only to the Contract Administrator, and shall make only such inspections or tests as the Contract Administrator may direct.

3.9 Defective Materials And Work

.1 Where evidence exists that defective Work has occurred or that Work has been carried out incorporating defective materials, the Contract Administrator may have tests, inspections or surveys performed, analytical calculations of structural strength, made and the like, in order to help determine whether the Work must be corrected or replaced. Tests, inspections or surveys or calculations carried out under these circumstances will be made at the Contractor's expense, regardless of their results, which may be such that, in the Contract Administrator's opinion, the Work may be acceptable.

.2 All testing shall be conducted in accordance with the requirements of the Building Code, except where this would, in the Contract Administrator's opinion, cause undue delay or give results not representative of the rejected material in place. In this case, the tests shall be conducted in accordance with the standards given by the Contract Administrator.

.3 Materials or Work which fail to meet the requirements Specified in the Contract Documents may be rejected by the Contract Administrator whenever found at any time prior to the Total Performance of the Work regardless of previous inspection. If rejected, defective materials or Work shall be promptly removed and replaced or repaired to the satisfaction of the Contract Administrator, at no expense to the City.

END OF SECTION

PART 1 - GENERAL

1.1 Definitions

.1 The following Definitions shall apply in this Specification

.2 Contract Documents

.1 The Contract Documents consist of the Drawings, Specifications and Reports which form part of the agreed Contract.

.3 Contract Administrator

.1 The Contract Administrator is the Architect, SER, persons or entities engaged by the City. The term Contract Administrator means the Contract Administrator or the Contract Administrator's authorized representative.

.4 Contractor

.1 The term Contractor is defined to include any of the following: Construction Manager, General Contractor, Structural Steel Erector, Structural Steel Fabricator, Subcontractor or Supplier.

.5 City

.1 The City is the person or entity identified as such in the Contract. The term City means the City or the City's authorized agent or representative, but does not include the Contract Administrator.

1.2 Work Included

.1 Comply with Division 1 - General Requirements and all documents referred to therein.

.2 Provide all labour, materials, plant and equipment to complete the steel reinforcement Work indicated in the Contract Documents and specified in this Section.

1.3 Section Includes

.1 This Section includes: Concrete reinforcing, and submittals.

1.4 Related Work Specified Elsewhere

1.5 Reference Standards, Codes, And Acts

.1 Conform to the requirements of the local building code identified on the Structural General Notes as amended by all subsequent Regulations issued to the date of this Specification and applicable acts of authorities having jurisdiction.

.2 All references to the Standards and publications noted below shall be to the edition referenced in the local building code identified on the Structural General Notes, or to the edition referenced in the latest published editions or revisions of all Standards published by the Canadian Standards Association issued to the date of this Specification, whichever is the later edition or revision.

.3 All references noted below, which are not referenced by the local building code or the Standards published by the Canadian Standards Association, shall be to the latest edition and revision published to the date of this Specification.

.4 Standards and publications referenced by the Standards noted below are to apply even if they are not included in the list. Where such reference is made, it shall be to that latest edition and revision published to the date of this Specification.

.5 Where there are differences between the Contract Documents and the codes, standards, or acts, the most stringent shall govern.

.6 ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

.7 ASTM A497 - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.

.8 CSA A23.1/A23.2 - Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete.

.9 CSA A23.3 - Design of Concrete Structures.

.10 CSA G30.18 - Carbon Steel Bars for Concrete Reinforcement.

.11 CSA S304 - Design of Masonry Structures.

.12 CSA S413 - Parking Structures.

.13 CSA W186 - Welding of Reinforcing Bars in Reinforced Concrete Construction.

.14 EN 15804 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

.15 ISO 14025 - Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures.

.16 ISO 14040 - Environmental management -- Life cycle assessment -- Principles and framework.

.17 ISO 14044 - Environmental management -- Life cycle assessment -- Requirements and guidelines.

.18 ISO 21930 - Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services.

.19 RSIC Manual of Standard Practice - Manual of Standard Practice.

1.6 Qualifications

.1 The Contractor shall ensure that those responsible for welding reinforcement shall be certified by the Canadian Welding Bureau under the requirements of CSA W186.

1.7 Submittals

.1 Shop Drawings for Reinforcement

.1 Reproduction of the structural Drawings, to serve as shop drawings, will be permitted and is subject to separate agreement between the Structural Engineer and the Contractor. Any costs associated with the preparation of the structural Drawings for use by the Contractor shall be paid for by the Contractor.

.2 Prepare reinforcement shop drawings and bar lists taking into account all openings and recesses shown on the architectural, structural, mechanical and electrical Drawings, and on the sleeving shop drawings prepared by all other Sections.

.3 Prepare shop drawings to a minimum scale of 1:50 or larger as deemed necessary by the Contractor. Shop drawings shall be clear and complete and shall allow placement of reinforcement without reference to the Contract Documents.

.4 Provide adequate space on all shop drawings immediately above the drawings title block for the Contract Administrator's shop drawing review stamp. Where requested by the Contract Administrator, the stamp is to be inserted by this section directly into the shop drawing prior to submission. The stamp shall be positioned in the same location on each shop drawing, and in no case shall the allocated space be less than 63 mm x 75 mm. Request the details of these requirements from the Contract Administrator no less than 2 weeks before the commencement of shop drawings.

.5 Detail concrete reinforcement in accordance with the Contract Documents, CSA A23.1/A23.2, and detailing standards in RSIC Manual of Standard Practice.

.6 Detail reinforcement for masonry in accordance with the Contract Documents, CSA A23.1/A23.2, CSA S304, and detailing standards in RSIC Manual of Standard Practice.

.7 As a minimum, the shop drawings shall show the following:

.1 Bar sizes, spacing, lap lengths, location and quantities of reinforcement and welded wire fabric.

.2 Bar spacing requirements and provisions for spacers where required.

.3 Locations where reinforcement is considered to be bundled, as defined by CSA A23.1/A23.2.

.4 Identification of each bar with a code mark corresponding to the bar lists.

.5 Detail sections to fully illustrate placement of concrete reinforcement at areas such as openings, change of levels, spandrel elements, stairs, and wherever else required.

.6 Placing sequence for areas with multiple layers of reinforcement.

.1 Minimum clearances between reinforcement and minimum concrete cover.

.7 Location, number and type of support accessories, including support bars suitably sized and spaced to rigidly support the weight of reinforcement and imposed loads during construction. Where 10M top bars and welded wire fabric are shown in the Contract Documents, provide adequate supports to ensure that these bars are not bent or displaced prior to or during the concreting operation.

.8 Location and embedment of dowels.

.9 The size, location, and elevation of mechanical splices, as well as required installation procedures.

.8 Provide dowels for reinforced masonry walls (load bearing or non load bearing) from slabs and walls. Coordinate location of walls with architectural Drawings.

.9 Submit code marks or symbols used on reinforcement of each manufacturer so that the Contract Administrator may identify grades and sizes of reinforcement.

.2 Certificates

.1 Reinforcement from Canadian Manufacture: Provide the Contract Administrator with a certified copy of the mill test reports for reinforcing steel showing physical and chemical analysis. For weldable reinforcement, include verification of its weldability. Reports to be submitted a minimum of 4 weeks prior to commencing fabrication.

.2 As-Built Drawings

.1 Mark on a complete set of final drawings any changes, additions, or deletions that occur during construction as a result of the Contractor's Work, change orders, or for any other reason.

.2 For all shop drawings marked "Reviewed as Noted" or "Revise and Resubmit", update and submit a record set of these drawings at the completion of the structural Work. Ensure that these drawings reflect the changes and are coordinated with the final drawings noted above.

1.8 Tolerances

.1 Perform fabrication and setting so that completed Work will be within the tolerances set out in CSA A23.1/A23.2 .

.2 These tolerances are acceptable with regard to structural requirements. Interfacing tolerances may not be compatible with the above. Review and coordinate interfacing tolerances so that the various elements come together properly.

PART 2 - PRODUCTS

2.1 Reinforcement

.1 Reinforcing Steel, Deformed: Canadian manufacture to CSA G30.18, billet steel, Grade 400R and 400W, weldable and regular bars. Finish types: unfinished.

.2 Welded Steel Wire Reinforcement, Plain: ASTM A185, in flat sheets. Finish types: unfinished.

2.2 Accessories

.1 Minimum gauge as required for support of stability of steel reinforcement during reinforcement placement and concreting operation.

.2 Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapour barrier puncture.

.3 Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size, and shape as required.

.4 Special Bar Supports for Reinforced Concrete Cast Against Soil/Rock: Use precast concrete supports for exposed concrete beams and soffits and concrete cast against soil/rock. Precast concrete supports shall be made of concrete quality, class and strength at least equal to that specified in the Contract Documents for the member in which they are used.

PART 3 - EXECUTION

3.1 Fabrication

.1 Fabricate reinforcement in accordance with:

.1 CSA A23.1/A23.2.

.2 RSIC Manual of Standard Practice.

.3 CSA W186 for welded reinforcement.

.2 Locate reinforcement splices not indicated on the Drawings, at point of minimum stress. Review location of splices with the Contract Administrator. Stagger splices to minimize cross sectional area at any one point in beams and walls.

.3 Unless noted otherwise in the Contract Documents, bend reinforcement once only and at room temperature of 18°C, do not straighten or rebend reinforcement and do not field bend reinforcement. Do not use bars with kinks or bends not shown on the Drawings. Replace bars which develop cracks or splits.

3.2 Placement

.1 Prior to placing concrete, place support and secure reinforcement against displacement to CSA A23.1/A23.2 and as indicated on reviewed placing drawings.

.2 Do not displace or damage vapour barrier during reinforcement placement.

.3 Accommodate placement of formed openings.

.4 Maintain concrete cover as noted on the Contract Documents.

.5 Where continuous drop panels or slabs thickenings are noted on the Drawings, place bottom slab reinforcement in the bottom of the continuous drop panel or slab thickening, unless noted otherwise on the Drawings.

.6 Lap ends and sides of welded wire fabric as noted on the Drawings, but in no case less than 300 mm.

3.3 Quality Control

.1 Provide a system of quality control to ensure that the minimum standards specified in the Contract Documents are attained.

.2 Bring to the attention of the Contract Administrator any defects in the Work or departures from the Contract Documents which may occur during Construction. The Contract Administrator will decide upon corrective action and give recommendations in writing.

.3 The Contract Administrator's general review during construction and inspection and testing by the independent inspection and testing companies are both undertaken to inform the City of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve the Contractor of its contractual responsibilities with respect to quality control.

.4 Prior to commencing significant segments of the Work, give the Contract Administrator and independent inspection and testing companies appropriate notification so as to afford them reasonable opportunity to review the Work. Failure to meet this requirement may be cause for the Contract Administrator to classify the Work as defective.

3.4 Inspection And Testing

.1 The City or Contract Administrator will appoint the independent inspection and testing companies to make inspections or perform tests as the Contract Administrator directs. The independent inspection and testing companies shall be responsible only to the Contract Administrator, and shall make only such inspections or tests as the Contract Administrator may direct.

.2 When defects are revealed, the Contract Administrator may request, at the Contractor's expense, additional inspection or testing to ascertain the full extent of the defect.

3.5 Defective Materials And Work

.1 Where evidence exists that defective Work exists or that Work has been carried out incorporating defective materials, the Contract Administrator may have tests, inspections or surveys performed, analytical calculations of structural strength made, and the like, in order to help determine whether the Work must be replaced. Tests, inspections or surveys or calculations carried out under these circumstances will be made at the Contractor's expense, regardless of their results, which may be such that, in the Contract Administrator's opinion, the Work may be acceptable.

.2 All testing shall be conducted in accordance with the requirements of the Building Code, except where this would, in the Contract Administrator's opinion, cause undue delay or give results not representative of the rejected material in place. In this case, the tests shall be conducted in accordance with the standards given by the Contract Administrator.

.3 Materials or Work which fails to meet the requirements specified in the Contract Documents may be rejected by the Contract Administrator whenever found at any time prior to the Total Performance of the Work regardless of previous inspection. If rejected, defective materials or Work shall be promptly removed and replaced or repaired to the satisfaction of the Contract Administrator, at no expense to the City.

END OF SECTION

PART 1 - GENERAL

1.1 Definitions

.1 The following Definitions shall apply in this Specification:

.2 Contract Documents

.1 The Contract Documents consist of the Drawings, Specifications and Reports which form part of the agreed Contract.

.3 Contract Administrator

.1 The Contract Administrator is the Architect, SER, persons or entities engaged by the City. The term Contract Administrator means the Contract Administrator or the Contract Administrator's authorized representative.

.4 Contractor

.1 The term Contractor is defined to include any of the following: Construction Manager, General Contractor, Structural Steel Erector, Structural Steel Fabricator, Subcontractor or Supplier.

.5 City

.1 The City is the person or entity identified as such in the Contract. The term City means the City or the City's authorized agent or representative but does not include the Contract Administrator.

1.2 Work Included

.1 Comply with Division 1 - General Requirements and all documents referred to therein.

.2 Provide all labour, materials, plant and equipment to complete the cast-in-place concrete Work indicated on the Drawings and specified in this Section.

1.3 Section Includes

.1 This Section includes cast-in-place concrete, including:HVSCM concrete, concrete mix design requirements, and qualification requirements.

1.4 Related Work Specified Elsewhere

.1 Section 03 10 00 - Concrete Forming: Forms and accessories for formwork.

.2 Section 03 20 00 - Concrete Reinforcement

.3 Section 05 12 00 - Structural Steel.

.4 Section 31 23 00 - Excavation and Fill:

.1 Backfilling below base course, beneath slabs, and behind walls.

.5 Section 04 20 00 - Engineered Masonry: Grouting beneath base plates bearing on masonry.

1.5 Reference Standards, Codes, And Acts

.1 Conform to the requirements of the local building code identified on the Structural General Notes as amended by all subsequent Regulations issued to the date of this Specification and applicable acts of authorities having jurisdiction.

.2 All references to the Standards and publications noted below shall be to the edition referenced in the local building code identified on the Structural General Notes, or to the edition referenced in the latest published editions or revisions of all Standards published by the Canadian Standards Association issued to the date of this Specification, whichever is the later edition or revision.

.3 All references noted below, which are not referenced by the local building code or the Standards published by the Canadian Standards Association, shall be to the latest edition and revision published to the date of this Specification.

.4 Standards and publications referenced by the Standards noted below are to apply even if they are not included in the list. Where such reference is made, it shall be to that latest edition and revision published to the date of this Specification.

.5 Where there are differences between the Specifications and Drawings and the codes, standards or acts, the most stringent shall govern.

.6 ACI 228.1 - In-Place Methods to Estimate Concrete Strength.

.7 ASTM C900 - Standard Test Method for Pullout Strength of Hardened Concrete.

.8 CSA A23.1/A23.2 - Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete.

.9 CSA A3000 - Cementitious Materials Compendium.

.10 CSA A3001 - Cementitious Materials for use in Concrete.

.11 EN 15804 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

.12 ISO 228-1 - Pipe threads where pressure-tight joints are not made on the threads -- Part 1: Dimensions, tolerances and designation.

.13 ISO 14025 - Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures.

.14 ISO 14040 - Environmental management -- Life cycle assessment -- Principles and framework.

.15 ISO 14044 - Environmental management -- Life cycle assessment -- Requirements and guidelines.

.16 ISO 21930 - Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services.

1.6 Tolerances

.1 Perform placing operations so that completed Work will be within the tolerances set out in CSA A23.1.

.2 Variations in building lines which result in extension of the building over lot lines or restriction lines will not be permitted.

.3 These tolerances are acceptable with regard to structural requirements. Interfacing tolerances may not be compatible with the above. Review and coordinate interfacing tolerances so that the various elements come together properly.

1.7 Qualifications

.1 The 'foreperson' or 'lead hand' supervising the placement, consolidation, finishing and curing of the concrete shall be certified under an industry recognized concrete finishing program, such as the ACI Concrete Flatwork Finisher/Technician Certification Program.

.2 The concrete supplier shall be certified by Concrete Manitoba and shall hold a current "Certificate of Ready Mixed (or Mobile Mix) Concrete Production Facilities" as issued by Concrete Manitoba.

.3 Where concrete toppings are specified in the Contract Documents, the Contractor shall ensure that the concrete flooring contractor assumes responsibility for all aspects of the topping construction. This will include, but is not limited to the base course or substrate preparation, review of concrete mix design, concrete supply, bonding agents, placing, finishing and curing etc.

1.8 Concrete Mix Design

.1 Design of Concrete Mixes

.1 Concrete mixes are to be designed in accordance with the Performance Alternative outlined in CSA A23.1/A23.2. The mixes shall be designed such that they will be homogeneous, uniformly workable, readily placeable into corners and angles of forms and around reinforcement by the methods of placing and consolidation employed on the Work, but without permitting materials to segregate or without permitting excessive free water to collect on the surface. The concrete, when hardened, shall have the qualities specified in the Contract Documents and in the concrete mix design.

.2 When designing the concrete mixes, the Contractor shall ensure that the supplier is cognizant of the curing requirements outlined in the Contract Documents andCSA A23.1/A23.2. If a particular concrete mix requires curing in addition to that specified, the Contractor shall be responsible for providing this additional curing.

.3 Specified Strength: As called for on Drawings. Where walls are integral with columns of different specified strengths, cast walls and columns with concrete of the higher specified strength.

.4 Modulus of Elasticity (E): For each concrete mix design, the Modulus of Elasticity, shall not to be less than (3,300(f 'c)^0.5 + 6,900) x (Yc/2,300)^1.5 MPa.

.5 Fly Ash: The use of fly ash in concrete that will be exposed to view or in concrete that will be exposed to freeze-thaw cycles or de-icing chemicals is subject to review and acceptance by the Contract Administrator.

.6 Use of calcium chloride shall not be permitted.

.7 The Contractor shall coordinate the mix designs for suitability with concrete pumping.

.8 The Contractor shall design concrete mixes so they maintain their workability based on assumed minimum discharge and placing rates.

1.9 Samples And Assistance

.1 Concrete Test Cylinders

.1 Supply materials for concrete test cylinders, the cost of which shall be paid for by the Contractor.

.2 Cooperate in the execution of the concrete quality testing program. Furnish concrete required, protect specimens against injury and loss, and assist in the sampling and storage of specimens, as required.

.3 For all concrete compressive strength tests, 100 mm x 200 mm cylinders shall be used.

.4 Provide sufficient field curing storage facilities so that cylinders representing the various areas can be safely stored in locations representing the curing conditions for those areas. Move the field cured cylinder storage facilities from area to area as the Work progresses.

.2 Pullout Tests

.1 If requested by the Contract Administrator, install pullouts to the requirements of the inspection and testing company.

.2 Installation of pullouts shall comply with the requirements of ASTM C900 and ACI 228.1.

.3 Maturity Tests

.1 If pull-out tests are required, maturity meters shall be used to determine when pullout tests can be made.

.2 Installation, equipment and procedures shall comply with ACI 228.1.

.4 Substrate (Soil/Rock) Inspection

.1 Assist the geotechnical Contract Administrator in making their inspections or tests.

1.10 Submittals

.1 Surveys

.1 Submit surveys in accordance with Section 03 10 00 - Concrete Forming.

.2 Certificates

.1 The Contractor shall ensure that the concrete supplier submits a current “Certificate of Ready Mixed (or Mobile Mix) Concrete Production Facilities,” as issued by Concrete Manitoba.

.2 Prior to beginning Work and when any change in materials or source of supply is proposed, provide the following certificates prepared by an independent inspection company;

.1 Certification that all raw materials used in the production of concrete proposed for the Work comply with the requirements of the Specifications and CSA A23.1/A23.2.

.2 Certification that compressive strength, slump, entrained air content, and other specified properties will be met, using the proposed mixes.

.3 Certification that classes of exposure C-1, A-1 and C-XL will meet the 56-day limits specified in CSA A23.1 for the rapid chloride permeability test, using the proposed mixes.

.4 Certification that the chloride ion content in the concrete, before exposure, shall not exceed 0.06% by mass of the cementing materials.

.3 The Contractor shall ensure that the concrete supplier submits representative chloride permeability test data distributed over a period of 56 days for concrete exposure classes C-1, A-1 and C-XL with and without calcium nitrite corrosion inhibitor or any other admixture containing ionic salts.

.4 The Contractor shall ensure that the concrete supplier submits their most current "Concrete Mix Design Statistical Analysis" records for the proposed concrete plant. These records shall indicate the concrete supplier's average strength, standard deviation, coefficient of variation and target strength, as per the requirements of CSA A23.1 and Concrete Manitoba.

.3 Concrete Mix Designs

.1 Well in advance of the supply of concrete to the project submit, using the standard Concrete Manitoba form for Concrete Mix Design Submissions, all concrete mix designs for review. The mix designs shall include, as a minimum the following information:

.1 Concrete strength;

.2 Exposure class;

.3 Water-cement ratio;

.4 Maximum aggregate size;

.5 Maximum Supplementary Cementing Mateials (SCM) replacement;

.6 Additional durability and architectural requirements;

.7 Slump range;

.8 Plastic air range;

.9 Method of placement;

.10 Dosage of corrosion inhibitor;

.11 Class of HVSCM (1 or 2);

.12 Other specific information regarding the source and type of all materials being proposed;

.13 Source of Supplementary Cementing Materials (SCM's).

.14 Assumed minimum discharge and placing rates.

.2 Describe in detail on the mix design summary, the location(s) where each mix is to be placed in the structure.

.4 Concrete Quality Plan

.1 At least four weeks prior to the supply of concrete to the project, submit a complete "Concrete Quality Plan", in the format provided by Concrete Manitoba.

.5 HVSCM Concrete

.1 For concrete with HVSCM such as fly-ash, slag and silica fume, submit documentation providing the actual reduction of Portland cement from the base mix to the actual HVSCM mix for all concrete – see below for further information. The Contractor shall ensure that the information shall be submitted in a letter signed by the concrete supplier/manufacturer or professional engineer acting on their behalf.

.1 The reduction in Portland cement from Base Mix to Actual SCM Mix (as a percentage of Base Mix), where Base Mix is defined below. This can be submitted as a total reduction of Portland cement for all the concrete mixes used on the project.

.2 Portland cement content of Base Mix (kg/cub. m) = Design strength values in MPa at 28 days x K

where K = 10 for non-air-entrained concrete, or K = 12.5 for air-entrained concrete.

.3 Portland cement reduction = (Portland cement content of Base Mix – Portland cement content of Actual SCM Mix) / Portland cement content of Base Mix.

.6 Curing Procedures

.1 At least four weeks prior to implementation in the field, submit a detailed description of the procedures which will be employed to cure the structure.

.2 As a minimum, the procedures shall indicate:

.1 The method for protecting the concrete from evaporation of surface moisture from the fresh concrete;

.2 The type of curing method to be used;

.3 Details of how various surfaces will be cured (slabs, walls, columns, ramps etc.)

.4 How the surface will be kept moist, and the quality control requirements for keeping the surface moist;

.5 The time of initiation and duration of curing;

.6 Provisions to address potential problems such as high winds and hot and cold weather;

.7 The limitations of access, if any, to the surfaces being cured; and

.8 A Quality assurance/Quality control program detailing how the curing program will be implemented, monitored and documented.

.3 Submit a 300 mm x 300 mm sample of each type of material (absorptive mat, fabric, plastic film, waterproof paper etc.) which will be used to cure the concrete.

PART 2 - PRODUCTS

2.1 Materials

.1 Concrete: Normal density concrete with an air-dry density between 2350 and 2450 kg/cub. m. Conform to CSA A23.1.

.2 Cement Type: GU General Use Portland Cement and HS Cement for foundations pile caps, walls and grade beams in contact with native soil.

.3 Supplementary Cementing Materials: Conform to CSA A3001 Fly Ash, Type F, Cl, CH, Ground Blast Furnace Slag, Type S, and Silica Fume, Type SF.

.4 Water: Clean, potable and not detrimental to concrete.

.5 Nominal Size of Coarse Aggregate: 20 mm, except as noted below.

.1 Use pea gravel (5 mm to 10 mm) where concentration of reinforcement requires the use of a smaller diameter aggregate.

.2 Use 10 mm (maximum) aggregate in toppings that are less than or equal to 75 mm in thickness, and 20 mm aggregate in toppings greater than 75 mm in thickness.

.6 Admixtures: Conform to CSA A23.1.

.1 Corrosion Inhibitor Admixture: Calcium nitrite based corrosion inhibitor, such as "DCI" or “DCI(S)” by W.R. Grace & Co. (or approved equivalent), shall be added at the rate of 10.1 litres per cubic metre of concrete, to all concrete designated Exposure Class 'C-1', unless noted otherwise in the Contract Documents. The corrosion inhibitor shall contain 30 ± 3 percent of calcium nitrite by weight. The selection of “DCI” or “DCI(S)” (or approved equivalent) shall be as directed by the admixture supplier, based on anticipated placing and curing conditions and the specific concrete mix design selected.

.7 Shrinkage Control Fibres: “Dramix” steel fibres by Bekaert or approved equivalent, 60/1.05.

.8 Curing Compound: Conform to CSA A23.1.

.9 Grout Beneath Base Plates: Non-shrink flowable grout in-Pakt by King Construction Products or approved equivalent, having a compressive strength at 28 days of at least 35 MPa. Where grout is exposed to view or weather, use non-ferrous grout.

.10 HVSCM Concrete

.1 Cement Type: General Use Portland Cement (Type GU).

.2 Compressive Strength: Achieved at 56 days.

.3 Supplementary Cementing Materials (SCMs)

.1 Supplementary cementing materials fly-ash, granulated blast furnace slag or silica fume, shall comply with the requirements of CSA A23.1 and CSA A3001.

.11 Unshrinkable Fill

.1 Cement type-General Use GU Portland

.2 Minimum 24 hour strength: 0.07 MPa

.3 Maximum 28 day strength: 0.4 MPa

.4 Class of exposure: Not Applicable

.5 Size of coarse aggregate: 20 mm to 40 mm

.6 Slump at point of discharge: 150 mm to 200 mm

.7 Calcium chloride or pozzolanic mineral admixtures shall not be used. Air entraining admixtures may be added if desired by the Contractor.

.12 Sealant for Exposed Separation Strips, Construction Joints, and Temporary Opening Joints: Multi-Component Polyurethane 'Sikaflex 2C-SL' by Sika, or an equivalent approved by the Contract Administrator.

PART 3 - EXECUTION

3.1 General

.1 Ensure minimum concrete discharge and placing rates are maintained to avoid unexpected cold joints from forming in the structure.

3.2 Examination

.1 Verify lines, levels, and dimensions before proceeding with the Work of this section.

3.3 Pre - Pour Meeting

.1 Prior to the initial supply of concrete to the project, the Contractor must schedule a "pre-pour meeting" as outlined in the concrete supplier's concrete quality plan.

3.4 Construction Joints

.1 Obtain approval from the Contract Administrator for location and details of construction joints not shown on the structural Drawings.

.2 Provided proper placing, curing and protection means and methods are employed by the Contractor, the maximum length/height of concrete pours shall be as follows

.3 The maximum length of a suspended concrete slab pour shall be 40 m.

.4 The maximum length of a concrete slab on steel deck pour shall be 30 m.

.5 The maximum length of a slab-on-grade pour shall be 30 m.

.6 The maximum length of a concrete foundation wall pour shall be 15 m.

.7 The maximum height of a concrete pour shall be 4.5 m.

.8 If the construction joints (including joints around temporary openings) will be exposed in its permanent condition, such as in a Parking Garage, the joints must be caulked as outlined in this Specification.

.9 Do not place concrete on a sub-grade that has been frozen and thawed until the sub-grade has been reviewed by the geotechnical Engineer and approved. If, in the geotechnical Engineer's opinion, the safe bearing capacity of the sub-grade has been reduced to below 25 kPa, remove the affected materials and replace with compacted granular fill at no additional cost to the City.

3.5 Placing Concrete

.1 Place all concrete in accordance with CSA A23.1, the concrete supplier's requirements and as specified in this Section.

.2 Immediately before placing concrete, clean forms and reinforcement of foreign matter.

.3 Discharge concrete into forms in accordance with the time frames specified in CSA A23.1.

.4 Place concrete on steel deck floors in a manner that avoids piling up of concrete. Do not drop concrete directly from buckets, but employ suitable means of distribution. Wet down deck during hot weather prior to concreting.

.5 Remove concrete spilled onto forms around hoisting equipment before depositing concrete in these areas.

.6 Pumping Concrete

.1 Pumping or pneumatic placing of concrete shall only be used if the velocity of discharge is reduced to a point where no separation or scattering of the concrete occurs, and the consistency of the mix has been designed to allow such a system with no adverse effects on the quality of concrete.

.2 The shotcrete process shall be deemed as being in contravention of the above clause.

.3 Excess grout or mortar used to lubricate pipelines, or washout water, must not be discharged into the forms.

.7 Shotcrete

.1 The use of shotcrete to construct any part of the Work shall be at the sole discretion of the Contract Administrator.

3.6 Curing Concrete

.1 Cure all concrete in accordance with CSA A23.1, the concrete supplier's requirements and as specified in this Section.

.2 HVSCM Concrete

.1 Cure all HVSCM concrete in accordance with the requirements of CSA A23.1. Wet curing shall commence immediately after placement and finishing of concrete.

3.7 Protection

.1 Protect all concrete in accordance with CSA A23.1, the concrete supplier's requirements and as specified in this Section; to prevent freshly deposited concrete from adverse conditions such as high winds, precipitation, freezing, being exposed to abnormally high temperatures or temperature differentials, premature drying, and moisture loss, for a period of time necessary to develop the specified properties of the concrete.

.2 The Contractor shall ensure that care is taken in concrete mix design and sequencing of concrete Work to avoid damage, to concrete that is aged between early and final concrete setting time, due to external vibrations from blasting, pile drilling, or other similar sources.

.3 Cold Weather Concreting

.1 Between the 15th of October of any year and the 15th of April of the following year, or when the temperature is at or below 5°C or anticipated to fall below 5°C within 24 hours of placing concrete, provide on hand and ready for use all equipment necessary for adequate cold weather protection and curing before concrete placement is begun.

.2 When fresh concrete is to be cast against existing concrete, prevent the loss of heat by extending the protection for the fresh concrete over the existing concrete.

.3 Insulate, or enclose within the protective housing, tie rods, reinforcement or metal which projects from the concrete being protected.

.4 Construct enclosures tight and safe for wind and snow loadings.

.5 Maintain housing, enclosures and supplementary heat in place for entire period of protection, except that sections may be temporarily removed as required to permit placing additional forms or concrete provided the uncovered concrete is not permitted to freeze. Make up time lost from the required period of protection at the required temperature before protection is discontinued and removed. Protection is not to be completely removed until the concrete has cooled to within the temperature differential limits specified in CSA A23.1.

.6 Locate heating units to avoid heating concrete locally or drying it excessively. Avoid high temperature and dry heating within enclosures.

.7 Take particular care to maintain edges and corners of concrete at the required temperature owing to their greater vulnerability to freezing.

.8 Provide sufficient insulation, and heat as necessary, to prevent freezing of frost susceptible soil which lies against structural elements; in particular protect soil beneath footings and behind foundation walls until the building is completed.

.4 Hot Weather Concreting

.1 When the rate of moisture evaporation exceeds 0.5 kg/sqm per hour or when the temperature is greater than or equal to 27°C, employ the following measures in addition to the requirements of CSA A23.1:

.1 Use ice as mixing water, or an approved equivalent temperature reducing or set retarding admixture to lower the concrete temperature.

.2 Dispatch ready-mix trucks and organize Work to keep mixing time to a minimum. Minimize exposure of mixing trucks to the hot sun while waiting. Water shall be made available to spray the exterior of the drum while the truck is waiting to discharge its concrete.

.3 Provide adequate personnel and organize Work to keep placing time to a minimum.

.4 Place concrete in layers thin enough and areas small enough so that the time interval for placing is reduced and compaction will ensure complete union of adjacent portions.

.5 With formed concrete, reliance shall not be placed on the forms alone to provide curing. Spray formwork with water to keep it tight and free from cracking.

.5 Protection of Completed Work

.1 At all times during the Work, protect exposed concrete, exposed masonry and other exposed members from staining or becoming coated with concrete leakage due to continuing concreting operations. Members which become coated may be classed as defective by the Contract Administrator.

.2 Protect exposed members from staining due to rusting of reinforcement projecting beyond construction joints.

.3 Take suitable measures to prevent spalling and cracking damage occurring to the structure due to water freezing in expansion joints, small holes, slots, depressions and take suitable measures to prevent damage occurring to foundations and the like due to frost action in the soil or backfill.

.4 The application of de-icing salts on completed Work is not permitted.

3.8 Openings Through Completed Members

.1 Do not cut openings through completed members without the Contract Administrator's approval.

.2 Where the location of openings is approved, locate the reinforcement by x-ray, cover meter, or other positive means as required by the Contract Administrator and adjust the location of the opening so that no reinforcement is cut unless specifically approved otherwise in writing by the Contract Administrator.

3.9 Making Good

.1 Make good temporary openings left in concrete construction around pipes, ducts and the like using a mortar of the same proportions as the surrounding Work. Reinforce mortar with welded wire fabric where openings exceed 75 mm. Roughen existing surfaces to receive mortar or apply suitable bonding agent such that mortar will be securely bonded to existing concrete.

3.10 Grouting Beneath Base Plates

.1 Grout beneath plates bearing on concrete with an approved non-shrink flowable grout. Comply with the manufacturer's directions for mixing and placing grout. Completely fill voids below plates. Fill voids left by shims after shims are removed.

.2 During cold weather, preheat base plates and footings and maintain temperature at minimum 12°C for 6 days after grouting.

.3 Refer to Section 05 12 00 - Structural Steel for lifting of base plates to determine adequacy of grouting. If defects are found, more base plates will be raised.

3.11 Treatment Of Formed Surfaces Not Designated As Architecturally Exposed Concrete

.1 Do Work in accordance with CSA A23.1 and as follows:

.1 Provide smooth form finish to concrete surfaces exposed to public view and surfaces to receive plaster, damp-proofing, moisture resistant membrane, and the like.

.2 Remove traces of form lining compound from concrete surfaces which may affect the bonding of following surface application.

3.12 Quality Control

.1 Implement a system of quality control to ensure that the minimum standards specified in this Section are attained.

.2 Adhere to the requirements of the project “Concrete Quality Plan” prepared and submitted as required by this Specification.

.3 Bring to the attention of the Contract Administrator any defects in the Work or departures from the Contract Documents which may occur during Construction. The Contract Administrator will decide upon corrective action and will provide recommendations in writing.

.4 The Contract Administrator's general review during construction and inspection and testing by independent inspection and testing agencies reporting to the Contract Administrator are both undertaken to inform the City of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve the Contractor of its contractual responsibility.

3.13 Notification

.1 Prior to commencing significant segments of the Work, give the Contract Administrator and independent inspection and testing companies appropriate notification so as to afford them reasonable opportunity to review the Work. Failure to meet this requirement may be cause for the Contract Administrator to classify the Work as defective.

3.14 Inspection And Testing

.1 Appointment of Independent Inspection and Testing Companies

.1 The City or Contract Administrator will appoint the independent inspection and testing companies to make inspections or perform tests as the Contract Administrator directs. The independent inspection and testing companies shall be responsible only to the Contract Administrator, and shall make only such inspections or tests as the Contract Administrator may direct.

.2 When defects are revealed, the City may request, at the Contractor's expense, additional inspection or testing to ascertain the full extent of the defect.

.2 Concrete Quality Tests

.1 Concrete quality tests shall be carried out in accordance with CSA A23.1 and shall include the following:

.1 Slump

.2 Air content of fresh concrete

.3 Temperature of fresh concrete

.4 Compressive strength

.2 Compressive Strength Tests: Compressive cylinder testing will be carried out in accordance with CSA A23.1 and as follows: Three companion laboratory cured concrete standard compression test cylinders; one tested at 7 days and two tested at 28 days, constitute a strength test. During the placing of concrete in cold weather one additional field cured test cylinder will be made and tested at 7 days. The results of the 7 day tests related to curing procedure shall be the basis to strip soffit forms from horizontal or inclined members.

.3 HVSCM Concrete: Compressive cylinder testing will be carried out in accordance with CSA A23.1 and as follows: Four companion laboratory cured concrete standard compression test cylinders; one tested at 7 days, one tested at 28 days and two tested at 56 or 91 days, whichever is the specified test age. In addition, two accelerated test cylinders shall be made and tested in accordance with CSA A23.1/A23.2 .

.3 Grout under Baseplates: At least one strength test may be made each day that grout is placed under baseplates.

3.15 Defective Materials And Work

.1 Where evidence exists that defective Work has occurred or that Work has been carried out incorporating defective materials, the Contract Administrator may have tests, concrete coring, inspections or surveys performed, analytical calculations of structural strength made and the like in order to help determine whether the Work must be repaired or replaced. Tests, inspections or surveys or calculations carried out under these circumstances will be made at the Contractor's expense, regardless of their results, which may be such that, in the Contract Administrator's opinion, the Work may be acceptable.

.2 All testing shall be conducted in accordance with the requirements of the local building code identified on the Structural General Notes, except where this would in the Contract Administrator's opinion cause undue delay or give results not representative of the rejected material in place. In this case, the tests shall be conducted in accordance with the standards given by the Contract Administrator.

.3 Materials or Work which fails to meet the requirements specified in the Contract Documents may be rejected by the Contract Administrator whenever found at any time prior to the Total Performance of the Work regardless of previous inspection. If rejected, defective materials or Work shall be promptly removed and replaced or repaired to the satisfaction of the Contract Administrator, at no expense to the City.

3.16 Protection

.1 Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Concrete floor finishing, including:

.1 Membrane forming curing compound; interior grade.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Reports:

.1 Submit log records for straightedge concrete finish tolerances.

.4 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Subcontractor:

.1 Has adequate equipment and skilled workers to perform the work expeditiously.

.2 Has successfully completed installations similar to that specified.

1.5 Site Conditions

.1 Perform work only when environmental conditions are as specified in Section 03 30 00.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 Membrane forming curing compound; interior grade:

.1 Water-based: transparent, in accordance with ASTM C309-19, Type 1, Class B, VOC-compliant, in a true-water based carrier.

.2 Acceptable Materials:

.1 W.R. Meadows Inc. 'VOCOMP-30'.

.2 Sika Canada Inc. 'Florseal WB 25'.

.3 Substitutions: in accordance with Section 01 25 00.

PART 3- EXECUTION

3.1 Concrete Slab Finishing

.1 General:

.1 Comply with concrete slab surface finishing tolerances schedule specified in this section.

.2 Strike off concrete level to screeds leaving no low spots. If vibrators are used on straightedge, ensure that concrete is not over-vibrated causing segregation and collection of water and fines on the surface.

.3 Smooth concrete to an even plane with a darby or bull float, and leave until bleed water and water sheen has disappeared.

.4 Proceed with finishing only when concrete has hardened sufficiently.

.5 Finish exposed edges of concrete surfaces smooth with an edging tool, with slightly round exposed corners.

.6 Finish concrete surface with power float or with metal hand floats in areas inaccessible to power floats. Floating shall embed large aggregate below surface, consolidate mortar at surface, with even planes, without humps or depressions, remove marks from edging, and prepare surface for further specified finishing. Do not bring water and fine material to surface by overworking.

.7 Steel trowel floated surface with power trowels or hand trowels in areas inaccessible to power trowels. Proceed with trowelling only when there is no sheen on surface. Repeat trowelling until surface is brought to approved finish. Allow sufficient time between trowelling for additional set of concrete.

.8 Rerun tooled edges following finishing of surfaces.

.9 Finish floor surfaces level, dense, with no aggregate showing, and free of blemishes and crazing.

.2 Scratch finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 6 mm (1/4") in 1 direction.

.1 Apply scratch finish to surfaces to receive concrete floor toppings.

.2 Apply scratch finish to surfaces to thick set mortar setting beds for bonded floor finishes at depressed slab locations.

.3 Float finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

.1 Apply float finish to concrete surfaces to receive trowel finishes and membrane finishes.

.4 Trowel finish: After applying float finish, apply first trowelling and consolidate concrete by hand or power-driven trowel. Continue trowelling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

.1 Apply trowel finish to surfaces unless otherwise indicated or scheduled.

.2 Apply trowel finish to surfaces where cleavage membrane is to be used for installation of hard surface tile.

.3 Apply single pass trowel finish to concrete deck surfaces to receive thin traffic coating materials in accordance with CSA S413-14.

3.2 Concrete Slab Surface Finishing Tolerances

.1 Finish slabs to receive waterproofing membrane materials to provide positive slope to water outlet without ponding.

.2 Concrete tolerances: Straightedge in accordance with CAN/CSA A23.1/A23.2-19.

.1 Class A: Place and steel trowel finish concrete floor surface of concrete floors to within ±8 mm in 3000 mm (±5/16 in 10 ft) as described in CAN/CSA A23.1/A23.2-19.

.1 Locations: under interior floor finishes unless noted otherwise.

.2 Class B: For exposed concrete and concrete floor scheduled or indicated to receive floor finishes: Place and steel trowel finish surface of concrete floors to within ±5 mm in 3000 mm (±3/16 in 10 ft) as described in CAN/CSA A23.1/A23.2-19. Floor finish shall be smooth and free of trowel marks or other defects which telegraph through to finished flooring when viewed from a distance range of within 1830 mm (6 ft).

.1 Locations: under tile flooring.

.3 Premium grade: For exposed concrete and concrete floor scheduled or indicated to receive premium floor finishes: Place and steel trowel finish surface of concrete floors to within ±3.2 mm in 3000 mm (±1/8 in 10 ft) as described in CAN/CSA A23.1/A23.2-19. Floor finish shall be smooth and free of trowel marks or other defects which telegraph through to finished flooring when viewed from a distance range of within 1830 mm (6 ft).

.1 Locations: under wood athletic flooring.

.3 Concrete tolerances; for sloped concrete floor slab assemblies:

.1 Provide minimum of 2% slope from the corner of each drain area in order for water to drain freely with minimal assistance.

3.3 Membrane Forming Curing Compound Installation

.1 Install in accordance with manufacturer's written requirements.

.2 Apply curing-sealing compound to new concrete as soon as the concrete is firm enough to work on after trowelling, except on coloured concrete, in which case application of curing-sealing compound shall not occur until after 30 days, minimum.

.3 Spray on in a fine, fog pattern without spurts and dribbles to form a thin, continuous film. Avoid puddles in low areas and if puddles occur, brush or roll them out.

.4 Apply 2 coats of curing-sealing compound at right angles. Apply second coat immediately prior to date of Substantial Performance.

3.4 Patching and Refinishing

.1 Before completion of the Work, patch and refinish defective surfaces to match surrounding areas with no discernible variation in appearance.

3.5 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.1 Field tests and inspections:

.1 Independent testing company shall measure for straightedge tolerances in accordance with CAN/CSA A23.1/A23.2-19, in accordance with Section 01 45 00.

.2 Give 4 Working Days' written notice to independent inspection and testing company in advance of concrete flooring placement and finishing.

3.6 Protection

.1 Protect finished concrete floor areas from abrasion traffic, and from damage caused by spillage of oil or other deleterious materials.

END OF SECTION

PART 1– GENERAL

1.1 Summary

.1 Section includes:

.1 Architectural precast concrete cladding.

1.2 Definitions

.1 Hairline cracks:

.1 Surface cracks of minute width, visible but not measurable by ordinary means.

1.3 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.4 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Submit engineered shop drawings.

.2 Shop drawings shall follow guidelines as set out in CPCI – Architectural Precast Concrete Walls Best Practice Guide (2017), and shall include:

.1 Show design loads and calculations, including mechanical connections, typical reaction, and support movement allowances, both vertical and horizontal.

.2 Location and dimensions of each unit in the completed structure.

.3 Location and layout for structural steel inserts and/or units, plates and dowels cast into cast-in-place concrete.

.4 Reinforcing details and grade of reinforcing.

.5 Concrete strength and admixtures used.

.6 Jointing clearances and clearances between the units and the structural building framework.

.7 Jointing profiles and edge profiles.

.8 Continuity of air barrier at interfaces between wall panels and fenestration products.

.9 Full size details of typical methods of sealant installation.

.10 Complete connection and insert details including materials, size and length of welds.

.11 Class of finish and location of each precast item.

.12 Manufacturing sequence to control consistency of colour and appearance qualities of panels within contiguous façade areas.

.13 Identifying marks for each precast unit.

.14 Location and details of lifting hooks and handling points.

.15 Sequence of erection and any special handling instructions or bracing required.

.16 Special precautions to be taken by other sections affecting the work of this section.

.17 Details of any special reinforcement which may be locally required around embedded units when such reinforcement is not shown in the Contract Documents.

.18 Submit comprehensive face mix design.

.3 Submit detailed welding procedure covering specified welds on erection and shop drawings.

.4 Submit mill test report for reinforcing steel, showing physical and chemical analysis, prior to commencing reinforcing work.

.5 Submit a Quality Assurance and Quality Control Procedure for the installation and testing of the joint seals.

.4 Samples:

.1 Submit precast concrete samples for review by the Contract Administrator, in sizes as directed by the Contract Administrator of the specified finish showing the expected range of variations in colour or appearance.

.2 Cladding panels:

.1 Upon acceptance of samples for finish, colour, appearance, and variation, fabricate and erect a full size panel at the Site for acceptance. “Full size panel” sample sizes may be smaller than actual full size as indicated in Contract Documents upon prior written approval from the Contract Administrator.

.2 The Contract Administrator shall review the full size panel prior to further production. No visible blotching, patchiness or shade difference will be accepted.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.5 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 36.

.2 Maintenance data:

.1 Submit maintenance manual specifically prepared for the project respecting the precast assembly and its components.

.2 Maintenance manual shall be prepared by the Contractor the manufacturer of the precast concrete panels, the joint sealant manufacturer, and the joint sealant installer.

1.6 Quality Assurance

.1 Qualifications:

.1 Manufacturer:

.1 Manufacturer shall be qualified in accordance with CSA A23.4-16.

.2 Precast concrete manufacturers shall be certified to Canadian Precast Concrete Quality Assurance (CPCQA) Certification Program in Architectural Precast Concrete Products, A1, prior to commencement of the Work.

.3 Only precast elements fabricated under the CPCQA plant certification program are acceptable, and plant certification shall be maintained for the duration of fabrication, erection, and until warranty expires.

.4 Precast manufacturing to meet the requirements of CSA A23.4-16, including Appendixes A and B, together with PCI MNL-116-21 and PCI MNL-117-13 and CPCQA certification requirements.

.2 Installers:

.1 Shall have 5 years' experience, minimum, in the application of the Materials, systems, and assemblies specified.

.2 Mock-ups:

.1 Construct mock-ups in accordance with Section 01 45 00.

.2 Construct at the Site a full scale mock-up of each type of precast concrete cladding assembly.

.3 Location and size of mock-up(s) shall be as directed by Contract Administrator.

.4 Mock-up shall demonstrate constructability for the proposed assembly, including interfaces between precast concrete cladding assemblies and adjoining assemblies.

.5 Mock-up shall include precast concrete panels, anchorage, and joint seals to adjoining assemblies and materials.

1.7 Product Handling

.1 Product handling shall in in accordance with CPCI – Architectural Precast Concrete Walls Best Practice Guide (2017), Section 01 60 00, and this section.

.2 Where lifting devices are required, design and cast lifting devices into the units so that they do not have to be removed or, if they have to be removed, they shall be arranged so that they are readily filled as part of the work of this section. Exposed to view cast-in lifting devices shall not be acceptable.

1.8 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

PART 2- PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Manufacturer shall be responsible for the design, connections, and installation of the precast concrete units, and shall direct the placing of items to be cast-in concrete work.

.2 Design precast concrete panel system, associated components, connections, and anchorages in accordance with CSA-A23.1-19, CSA A23.4-16, CSA-S16-19, CAN/CSA G40.20-13/G40.21-13, ASTM A123/A123M-17, CSA W59-24, and CPCI – Architectural Precast Concrete Walls Best Practice Guide (2017) to resist live, dead, wind, thermal, structure movement, and other relevant loads.

.3 Design and install joint seals (materials and profiles) in accordance with CPCI – Architectural Precast Concrete Walls Best Practice Guide (2017), ASTM C1193-16 when liquid-applied sealants are used, and sealant manufacturer's written requirements.

.4 Design and construct system to prevent air infiltration/exfiltration and water infiltration into building under design loads, including air barrier continuity at interfaces between wall panels and fenestration products. Design in accordance with CPCI – Architectural Precast Concrete Walls Best Practice Guide (2017).

.5 Design for superimposed loads where applicable.

.6 Design system to be suitable for below grade installation.

.7 Reinforce bearing areas against diagonal tension, splitting, rupture, and flexure. Extra ties, stirrups and reinforcing bars shall be placed at support points. Allow no bearing pressure in edges of unreinforced sections.

.8 Design and construct connections to accommodate the effect of shrinkage forces, temperature changes, and deflections of the supporting or adjacent structures.

.9 Maximum deflection shall be not more than 1/360th of the span for any unit under weight of dead and live loads.

.10 Mechanical connections:

.1 Unless otherwise accepted by Contract Administrator, connections for panels shall be stainless steel and shall be clearly shown and detailed on shop drawings.

.2 Design mechanical connections, such as bolts, inserts and special manufactured items to provide means of compensating for deviations in dimensions or thickness of unit in field. Select and joint materials in a manner such that embrittlement of any part of assembled connections will not occur. Bearing materials used in joints shall have a record of satisfactory performance otherwise test results to prove their adequacy shall be made available to Contract Administrator. Allow for steel plates and angles to be cast into base concrete structure. Include steel braces.

.3 Connections shall have ultimate strength such that when precast units are installed under the most unfavourable permissible conditions of construction tolerance, they will support total loads for which units are designed with a safety/resistance factor appropriate for the materials and load conditions.

.4 Allowance for movement shall be as specified in CSA A23.4-16.

.5 Connections indicated are schematic only. Be responsible for complete structural design and checking of anchorages and connections.

2.3 System Description

.1 Architectural precast concrete cladding panels:

.1 Precast base type A: with integral sill below openings.

.2 Precast base type B: without integral sill.

.3 Precast base type C: reduced height, with integral sill below openings.

.4 Precast base type D: reduced height, without integral sill.

.2 Provide the following:

.1 Precast concrete uninsulated (single wythe) panels.

.1 Provide real and false joints as indicated and as required by shop drawings.

.2 Structural steel inserts, and/or units, plates and dowels, cast into precast concrete members required for connection of precast concrete members. Provide loose structural steel items required to connect precast concrete members to the structure of the building or as required between precast concrete members.

.3 Install inserts required and supplied by other sections.

.4 Supply the following materials to be installed as part of the work of other sections:

.1 Structural steel inserts, and/or units and plates cast into the cast-in-place concrete.

.2 Special reinforcement which may be locally required around embedded units when such reinforcement is not shown.

.3 Complete layout details for the installation of the structural steel inserts and special reinforcement, including supervision and checking as required to verify that the installation is correct.

.5 Dual barrier modified rainscreen joint system between precast units: in accordance with Section 07 92 00. Interior bead of sealant shall serve as the air barrier.

2.4 Materials

.1 Precast concrete units:

.1 Cement, water reducer, air entrainment, pigment, sand, aggregates, water admixture: in accordance with CSA A23.4-16 and CSA-A23.1-19.

.1 Use white cement in face mix at exposed locations where required for finish specified.

.2 Aggregate: in accordance with CSA-A23.1-19 tested for soundness prior to manufacture in accordance with CSA A23.4-16.

.3 Use same brand and source of materials used for facing throughout the Work to ensure uniformity of colouration and other mix characteristics.

.4 Admixture in accordance with CSA-A23.1-19. Introduce admixtures to concrete at time of batching in accordance with the manufacturer's recommendations. Under no circumstances shall the use of calcium chloride or an admixture containing calcium chloride be permitted. Admixtures shall be subject to the acceptance of the Contract Administrator.

.5 Concrete reinforcement:

.1 Reinforcing steel: stainless steel in accordance with ASTM A555/A555M. Reinforcing larger than 6.4 mm (1/4") diameter shall be deformed bars conforming to the same standard. Welded wire mesh in accordance with ASTM A1064/A1064M-22.

.6 Water in accordance with CSA-A23.1-19.

.7 Structural steel: in accordance with CSA G40.20-13, or ASTM A36/A36M-19.

.8 Concrete mix:

.1 Use concrete mix designed to produce minimum of 35 MPa compressive strength at 28 days, with a maximum water/cement ratio in accordance with CSA A23.4-16.

.2 Air entrainment of concrete mix: in accordance with CSA-A23.1-19.

.3 Use of calcium chloride not permitted.

.9 Forms in accordance with CSA A23.4-16, constructed of approved concrete, steel or fibreglass reinforced plastic or high density overlaid plywood conforming to CSA O121-17 to obtain the quality of the finish specified.

.10 Form release agent: Commercially produced liquid release agent that will not bond with, stain or adversely affect precast concrete surfaces. Form release agent must be compatible with sealants.

.11 Zinc-rich paint:

.1 In accordance with CAN/CGSB 1.181-M99, standard brushing grade.

.2 Acceptable Materials:

.1 W.R. Meadows of Canada Limited ‘Galvafroid’.

.2 Substitutions in accordance with Section 01 25 00.

.12 Bolt, nuts, and washers: in accordance with ASTM F593-17, ASTM F594-09(2020).

.13 Bearing pads and shims: High density plastic, smooth both sides.

.14 Metal precast anchor and hardware finish: Stainless steel in accordance with ASTM A666.

.2 Joint sealants and dual barrier modified rainscreen joint system: in accordance with Section 07 92 00.

2.5 Finishes

.1 Finish on exposed surfaces of precast concrete work shall be grey or white, to Contract Administrator's selection, with smooth finish as follows:

.1 Colour and texture:

.1 CPCI finish code: CPCI 141.

.1 Limestone, concrete sand, white cement, grey pigment, light sandblast.

.2 Finish on non-visible surface of precast concrete work:

.1 Surfaces that are not intended to be visible in finished work shall use a float finish.

2.6 Fabrication

.1 Fabricate precast concrete wall panels in accordance with CSA A23.4-16.

.2 Exposed surfaces of precast concrete shall be made to requirements of CSA A23.4-16, Finish Grade 'A'.

.3 Precast concrete exposed surface finish shall match reviewed samples. Colour and texture shall be uniform and consistent throughout, free from air pockets, imperfections, blemishes and discolourations.

.4 Fabricate precast concrete units to profiles and sizes detailed in accordance with reviewed shop drawings and to requirements of local authority having jurisdiction.

.5 Execute work accurately, true to dimensions, square, in true planes, free from waves, twists, cracks, checks and broken edges. Warped, cracked, chipped or broken units shall not be used in the Work. Edges shall be straight and with clean accurate arris.

.6 Quality of concrete, placing materials in forms, vibrating, curing, stripping and handling shall be in accordance with CSA A23.4-16 and this Standard shall apply to precast concrete units required under this Section.

.7 Fabricate precast concrete units to maintain the most stringent requirements for dimensional tolerances as specified in CSA A23.4-16 and installation tolerances as specified in this section.

.8 Cast-in lifting devices required for erection of precast concrete work. Manufacturer shall verify that lifting devices used externally or installed are capable of supporting precast concrete work in altitudes occurring during course of manufacturing and installation.

.9 Cast-in anchors and inserts supplied by other sections as required. Conceal and permanently attach to reinforcing anchors, hooks and inserts.

.10 Manufacture units in accurate moulds designed to withstand vibration and lateral forces. Vibrate continuously during casting until full thickness is reached.

.11 Identify precast units with a unique number on back face as well as mark identifying orientation of unit in final position. The number must be visible. Maintain record of tracking of panels in yard through to installation.

.12 Curing shall be in accordance with CSA A23.4-16.

PART 3 - EXECUTION

3.1 Examination

.1 Examine surfaces that are to receive the work of this section and do not proceed until unsatisfactory conditions are corrected. Report defects of work prepared by other sections that affect the work of this section. Commencement of work shall imply acceptance of surfaces and tolerances.

.2 Examine the structure and any other elements of the building and if necessary, reinforce for any temporary load caused during erection.

3.2 Dimensions

.1 Check dimensions at Site before commencing shop drawings and before fabrication and report discrepancies to Contract Administrator and Contractor.

3.3 Welding

.1 Perform welding in accordance with CSA W59-24 and CSA W186-21. Organization undertaking welding shall be fully approved by Canadian Welding Bureau under requirements of CSA W47.1-19.

.2 Touch-up welds to galvanized steel with zinc rich paint after welding.

.3 Remove weld spatter, smoke marks, and other contaminants or visible indications of welding at visible and sealant joint surfaces of panels.

.4 Provide fit-up plates or angles to compensate for deviations alignment or location of inserts.

.5 Design welds to prevent tearing at end of weld that will cause progressive failure.

3.4 Shrinkage of Units

.1 Where shrinkage of units will occur after erection, final restraining connections shall be made after 75% of shrinkage of units has taken place and after initial creep of the structure has taken place.

3.5 Installation

.1 Erect precast concrete units in accordance with CSA A23.4-16 and CPCI – Architectural Precast Concrete Walls Best Practice Guide (2017).

.2 Where tolerances will interfere with work of other sections that will force other work to be out of plumb or deviate from straight lines indicated, provide remedial work for this defect.

.3 Install precast concrete units so that joints are within the following tolerances:

.1 Face width of joint; single wythe panels: Nominal 13 mm (1/2") joints, to vary not more than +/- 3.2 mm (1/8") unless otherwise indicated.

.2 Joint taper: unit edges not out of parallel over 0.6 mm in 300 mm (1/40" per foot) but not more than 3.2 mm (1/8") in total.

.3 Faces of adjacent panels, offset not more than 3.2 mm (1/8").

.4 Edge alignment: alignment of panels edges not to exceed 3.2 mm (1/8").

.5 Bowed panels, within allowable bowing tolerances, arranged so offset between adjacent panels does not exceed 6.4 mm (1/4").

.6 Assume face to be outside face. Allow for building tolerances.

.4 Fill holes around anchors with cement grout.

.5 Install each precast concrete unit in a way to permit removal and replacement of defective and rejected panels without damaging adjacent panels.

.6 Do not erect precast concrete units without a non-working supervisor being present.

3.6 Joint Sealants

.1 For precast concrete cladding assembly: provide two stage drained joints, with drain/vents in accordance with Section 07 92 00.

3.7 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00 and in accordance with the reviewed Quality Assurance and Quality Control Procedure submitted in accordance with the requirements of Section 03 45 00, supplemented as follows:

.1 Inspection at the Site:

.1 Inspection of the following will be carried out at the Site by the independent inspection and testing company:

.1 Erection.

.2 Connections in accordance with reviewed shop drawings.

.1 Joint widths.

.3 Joint sealants.

.2 Submit to the Contract Administrator certified copies of quality control tests related to the Work as specified in CSA A23.4-16.

.2 Acceptance of work:

.1 Concrete units containing concrete that has failed to meet required strength requirements shall be rejected.

.2 Units that do not meet specified tolerance, or are without proper reinforcement, proper opening, or proper inserts shall be rejected.

.3 Panels exhibiting any of the following shall be rejected:

.1 Visible damage such as bruises, cracks, chips, rust stains, soiling that cannot be removed.

.2 Excessive 'bugholes' (defined as presence of "bugholes" significantly exceeding accepted pre-production finish sample).

.3 Discolouration.

.4 Efflorescence.

.5 Poorly matched (visually obvious) patching.

.6 Permanent moisture "run-down" lines.

.4 Except for hairline cracks, units which have become cracked or broken will be rejected.

.5 Replace damaged panels or elements of precast as directed by the Contract Administrator.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Precast concrete stairs.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Shop drawings:

.1 Submit engineered shop drawings.

.2 Prepare and submit fully detailed shop and erection drawings. Indicate pertinent information in regard to the fabrication and erection of the precast concrete stairs including:

.1 Location of each unit in the completed structure and identifying marks for each unit.

.2 Size and dimensions of each stair and complete details of connections.

.3 Reinforcing details, grade of reinforcement, concrete strength and admixtures.

.4 Locations and details for lifting hooks and handling points.

.5 Sequence of erection and any special instructions that may be required in handling, setting and temporary bracing.

.6 Indicate design dead and live loads and clearly indicate dead and live loads transmitted to the structure.

.7 Locations of stair nosing and cast-in plates for railing connections.

.8 Indicate required fire resistance rating for stair assemblies.

.3 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Quality Assurance

.1 Qualifications:

.1 Company:

.1 Has proven experience in the design and manufacture of precast concrete stairs.

.2 Has adequate finances, equipment, plant and skilled personnel to expeditiously detail, fabricate and install the work of this section.

.2 Manufacturer:

.1 Qualified in accordance with CSA A23.4-16.

1.4 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of Section 03 48 19.

.2 Design lifting devices for the stair units to be safely and efficiently handled and not produce distortion, cracking or deflection nor strain or adversely affect the units.

.3 Support precast stair units uniformly while curing. Keep a daily check for discover development of warpage or other distortion. Rearrange supports as required to compensate for warpage or distortion, if required.

.4 Do not permit units to contact the earth or store so as to be exposed to splashing of earth, mud, and the like.

.5 Storage and protect fabricated stair units in the plant until units are required at the Site to meet construction schedule.

.6 Deliver precast stair units to the Site marked in manner as indicated on the reviewed shop drawings, showing final position in the Work. Schedule sequence of delivery to suit the storage space available and the handling and erection operations.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor’s LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor’s LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Design and construct precast in accordance with requirements of the building code.

.2 Design of precast concrete members, connections and anchorages tied into the structure shall be carried out under the direction of a structural engineer experienced in the field and in accordance with the requirements of Section 01 33 00. Structural engineer shall seal shop and erection drawings attesting to the adequacy of the members, their reinforcement and connections for the design and construction.

.3 Design connections and anchorage to transfer forces to structure.

.4 Design connections to allow for deviations of the building structure.

.5 Design stair with required fire resistance rating, if applicable.

.6 Design cast-in anchors for field-welded attachment of guards and handrails.

2.3 Materials

.1 Cement: Grey Portland, Type 10, CSA-A23.1-19.

.2 Aggregates: in accordance with CSA-A23.1-19.

.3 Reinforcement: in accordance with CSA-A23.1-19.

.4 Welded Steel Wire Fabric: in accordance with ASTM A1064/A1064M-22.

.5 Formwork Material: in accordance with CSA-A23.1-19.

.6 Tolerances: in accordance with CSA A23.4-16.

.7 Cast-in railing support plates: in accordance with CSA-S16-19.

2.4 Fabrication

.1 Manufacture steel forms to produce indent for resilient vinyl stair nosing in accordance with Section 09 65 13, primed for adhered application of tread nosing. Junction of tread and riser shall be rounded/coved as applicable.

.2 Thoroughly examine drawings, check interfacing with work of related sections and other factors influencing the design and performance of the work of this section and be fully cognizant of requirements.

.3 Underside of stairs shall have smooth trowel finish.

.4 Fabricate precast concrete stairs to requirements specified in CSA A23.4-16 and to riser, tread dimensions for various stairs as indicated.

.5 Forms shall be steel, accurately constructed, well braced and stiffened to avoid deformations under pressure of wet concrete and vibrators. Surfaces shall have smooth finish without pin holes, form marks or rough edges. Quality of forms shall be such that all dimensional tolerances and exposed concrete quality can be consistently maintained.

.6 Accurately set reinforcing steel and weld at intersections. Weld lifting hooks, and inserts to reinforcement. Vibrate continuously during casting of concrete.

.7 Reinforce bearing areas against diagonal tension, splitting, rupture and flexure if required. Place extra ties, stirrups, and reinforcing bars as required, at support points.

.8 Cast in lifting devices required for erection of the precast concrete stair units. Lifting devices used externally or cast into units shall be capable of supporting the precast units in positions that the units may be in during course of manufacture, transportation and installation. Ultimate capacity of lifting devices shall be sufficient to resist forces obtained by applying a minimum load factor 2.5 to weight of precast concrete work, unless otherwise required.

.9 Cast in welded plates and threaded inserts for stair handrails, as required for railings.

PART 3 - EXECUTION

3.1 Installation

.1 Erect precast concrete units in accordance with CSA A23.4-16.

.2 Set units plumb, true, and square with joints parallel and uniform in accordance with reviewed shop drawings.

.3 Securely anchor precast units to supporting work.

.4 Grout joints at supports with non-shrink grout.

.5 Patch holes at lifting hook locations, to match adjacent surfaces.

.6 Repair visual defects in surfaces in accordance with product manufacturer written installation requirements.

END OF SECTION

PART 1 – GENERAL

1.1 Summary

.1 Section includes:

.1 Self-leveling cementitious underlayment, to achieve flush and level floor finishes.

1.2 Administrative Requirements

.1 Cooperation:

.1 Verify that concrete supplied for slabs contains no admixtures that would be incompatible with concrete topping.

.2 Coordination:

.1 Coordinate locations where cementitious underlayment is being installed with transition trims as indicated in Division 09 floor finishes.

.3 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the Work.

.2 Include covering letter, signed by manufacturers of cementitious underlayment Materials and on manufacturer's letterhead, certifying that Materials comply with requirements of the Contract Documents and are suitable for intended use. Letter shall also certify that the Material is Portland cement-based having an inorganic binder content which is a minimum 80% Portland cement when tested per ASTM C150/C150M-22.

.3 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Applicators:

.1 Shall have 5 years' experience, minimum, in application of Materials specified.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 Self-levelling cementitious underlayment system:

.1 Description: Primer and mix of special cements and binders which, when mixed with water, become highly liquid cement compound that seeks its own level and produces flat, smooth surfaces.

.2 Compressive strength: 5000 psi, minimum, at 28 days, to ASTM C109/C109M-23 (air cure only).

.3 Aggregate: well graded, washed gravel 3 mm to 6 mm (1/8" to 1/4") or larger for use when underlayment is installed over 38 mm (1-1/2") thickness.

.4 Each material used in the application of self-levelling cementitious underlayment shall be as approved or manufactured by supplier of cementitious underlayment.

.5 Colour: Natural cement grey.

.6 Thickness: as indicated or scheduled.

.7 Acceptable Materials:

.1 Ardex Engineered Cements 'ARDEX K-15 Self-Levelling Underlayment Concrete'.

.1 Primer: ‘ARDEX P-51’ for standard absorbent concrete, and as recommended by cementitious underlayment manufacturer for other concrete porosities.

.2 Custom Building Products 'CustomTech TechLevel XP1 Self Leveling Underlayment’.

.1 Primer: Type as recommended by cementitious underlayment manufacturer.

.3 Mapei ‘Ultraplan 1 Plus’.

.1 Primer: Type as recommended by cementitious underlayment manufacturer.

.4 Substitutions: in accordance with Section 01 25 00.

.2 Water: Clean, potable, and sufficiently cool and not warmer than 21°C (70°F).

.3 Gypsum underlayment Materials will not be accepted.

2.3 Mixing

.1 Mix in accordance with manufacturer's written requirements.

PART 3 - EXECUTION

3.1 Examination

.1 Verify that specified field conditions are achieved before commencing work of this section.

.2 Surfaces to receive cementitious underlayment shall be smooth, sound, dry, and free from conditions that will adversely affect execution, permanence, or quality of the work of this section and in accordance with manufacturer's written requirements.

.3 Defective work resulting from application to unsatisfactory surfaces will be considered the responsibility of those performing the work of this section.

3.2 Preparation

.1 Substrate shall be sound, dry, and free of dust, dirt, paint, grease, oil or other foreign substances.

.2 Fill voids that allow the mix to run through the substrate.

.3 Keep other Subcontractors from area to be poured during day of pour. Keep heavy work off of cementitious underlayment for at least 2 to 4 hours following pour, in accordance with cementitious underlayment manufacturer's written requirements.

.4 Protect adjacent surfaces from damage resulting from work of this section. If necessary, mask and/or cover adjacent surfaces, fixtures, equipment, and the like by suitable means.

.5 Concrete substrates shall be cured a minimum of 28 days.

.6 Erect barriers to prevent entry and presence of personnel not performing work of this section during application of cementitious underlayment.

.7 Mechanically roughen and clean substrate, by shot blasting in accordance with cementitious underlayment manufacturer's written requirements.

3.3 Applications

.1 Verify that cementitious underlayment manufacturer's required conditions have been met at the Site prior to commencing application.

.2 Prime prepared substrate and apply cementitious underlayment in accordance with manufacturer's written requirements.

.3 Finished surface shall be true to plane within ±3 mm (1/8") in a 3 m (10’-0") as described in ACI 117-11, straightedge in accordance with CAN/CSA A23.1/A23.2-19.

.4 Apply cementitious underlayment such that no laps, voids, or other marks or irregularities are visible and may telegraph through to finished flooring installed under Division 09.

.5 Do not cover or bridge expansion joints or control joints. Provide 3 mm (1/8") wide sawcut joints over concrete slab control joints.

.6 Feather cementitious underlayment to level with adjacent finished floor heights to within 3 mm (1/8").

3.4 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.1 Field tests and inspections:

.1 Test for moisture vapour transmission in accordance with ASTM F710-22 and ASTM F1869-22 or ASTM F2170-19a in accordance with manufacturer’s written flooring installation requirements. Results must not exceed 170 µg/m² (3 lb per 1,000 ft²) in 24 hours when tested to ASTM F1869-22, or exceed 75% when tested to ASTM F2170-19a.

.2 Test for surface pH: Levels of pH shall not exceed the written recommendations of the flooring manufacturer and adhesive manufacturer. Test in accordance with ASTM F710-22.

.3 For each test type: Conduct 3 tests for flooring applications up to 93 m² (1000 ft²) in area, and 1 additional test for each additional 93 m² (1000 ft²) of flooring area.

.4 Testing shall be by independent inspection and testing company and in accordance with Section 01 45 00.

3.5 Adjusting and Cleaning

.1 Remove promptly as work progresses spilled or spattered cementitious underlayment materials from surfaces. Clean floors upon completion of the work of this section.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Masonry procedures for masonry work, including temporary bracing.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19 and as follows:

.1 Subcontractors required to attend the pre-installation meeting in addition to the Subcontractor for the work of this section shall include Subcontractors responsible for air barriers, siding/roofing, and glazing systems.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in masonry assemblies.

.3 Shop drawings:

.1 Submit shop drawings for masonry unit wall assemblies indicating:

.1 Proposed locations of movement (control) joints.

.2 Types of masonry units, grade, texture, typical dimensions, colours, special shapes and shape dimensions.

.3 Layout/coursing for each type of masonry unit. Units are not to be cut without approval of Contract Administrator: Layout using full brick masonry units.

.2 Submit engineered shop drawings for the following:

.1 Masonry reinforcement.

.2 Masonry ties and connectors.

.3 Masonry unit wall assemblies for walls that are to act as guards or are unsupported at the top course.

.4 Masonry ties and connectors for insulation thicknesses exceeding manufacturer's standard lengths.

.4 Samples:

.1 2 of each type of concrete masonry unit specified.

.2 2 of each type of architectural concrete masonry unit specified including corner units and in varying degrees of "roughness" or texture.

.3 1 of each type of masonry accessory specified.

.4 1 of each type of masonry reinforcement and tie proposed for use.

.5 Pigmented mortar samples for each mortar colour for colour match verification by Contract Administrator.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

.2 Masonry contractor's qualifications:

.1 Membership in good standing in Canadian Masonry Contractors Association (CMCA).

.2 Mock-ups:

.1 Mortar colour selection mock-ups:

.1 Construct sample panels approximately 900 mm x 900 mm (36" x 36") of exterior masonry faced assemblies to determine acceptable mortar colour.

.2 Quality control mock-ups for masonry veneer walls:

.1 Coordinate with mock-ups specified in Section 07 08 00.

.2 Construct mock-up panel of each type of masonry veneered wall construction 3000 mm x 3000 mm (10' x 10') at locations designated by Contract Administrator showing masonry colours and textures, use of reinforcement, ties, through-wall flashing, weep holes, jointing, coursing, mortar colours and workmanship.

.3 Select masonry units for use in mock-ups that represent the maximum variation in texture and colour.

.4 Mock-up shall remain in place until acceptance of masonry and as directed by the Contract Administrator.

.3 Accepted mock-ups may not remain as part of the completed work.

1.5 Site Conditions

.1 Cold weather construction requirements:

.1 Comply with requirements of CAN/CSA A371-14, and as follows:

Air Temperature, °C	General requirements during construction
0 to 4	Sand or mixing water shall be heated to a minimum of 20ºC and a maximum of 70ºC.
-4 to 0	Sand and mixing water shall be heated to a minimum of 20ºC and a maximum of 70ºC.

-7 to -4	(1) Sand and mixing water shall be heated to a minimum of 20ºC and a maximum of 70ºC. (2) Source heat shall be provided on both sides of the walls under construction. (3) Windbreaks shall be employed when the wind speed exceeds 25 km/h.
-7 and below	(1) Sand and mixing water shall be heated to a minimum of 20ºC and a maximum of 70ºC. (2) Enclosures and supplementary heat shall be provided to maintain an air temperature above 0ºC. (3) The temperature of the unit when laid shall be not less than 7ºC.

.2 Grout shall be placed in masonry at a minimum temperature of 20ºC and a maximum temperature of 50ºC.

.3 Mortar temperature shall not exceed 50ºC to avoid flash set.

.4 Maintain dry beds for masonry and use dry masonry units only. Do not wet masonry units in winter.

.2 Cold weather protection requirements:

.1 Comply with requirements of CAN/CSA A371-14, and provide protection requirements for completed masonry or sections not in progress shall be as follows:

Mean daily air temperature, °C	**Protection**
0 to 4	Masonry shall be protected from rain or snow for 48 h
-4 to 0	Masonry shall be completely covered for 48 h
-7 to -4	Masonry shall be completely covered with insulating blankets for 48 h
-7 and below	The masonry temperature shall be maintained above 0 ºC for 48 h by enclosure and supplementary heat

.3 Hot weather construction requirements:

.1 Comply with requirements of CAN/CSA A371-14, and as follows:

.1 The spreading of mortar beds shall be limited to 1.2 m, and the masonry units shall be set within 1 minute of spreading the mortar, when the air temperature is above:

.1 38ºC; or

.2 32ºC, with a wind velocity greater than 13 km/h.

.2 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 5 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 Architectural precast concrete: in accordance with Section 03 45 00.

.2 Mortar and grout for masonry: in accordance with Section 04 05 13.

.3 Masonry reinforcement and connectors: in accordance with Section 04 05 19.

.4 Masonry accessories: in accordance with Section 04 05 23.

.5 Concrete masonry units: in accordance with Section 04 22 00.

.6 Architectural concrete masonry units: in accordance with Section 04 22 23.

PART 3 - EXECUTION

3.1 Workmanship

.1 Build masonry plumb, level, and true to line, with vertical joints in proper alignment. Lay masonry to tolerances specified in CAN/CSA A371-14.

.2 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

.3 Masonry mortar and grout work: CAN/CSA A179-14 except where specified otherwise.

.4 Masonry work: CSA S304-14, CAN/CSA A370-14, and CAN/CSA A371-14 except where specified otherwise.

3.2 General Erection Tolerances

.1 Lay masonry units with required mortar joint thickness specified below, not to exceed 12.7 mm (1/2").

.2 Construction tolerances:

.1 Maximum variation from plumb in vertical lines and surfaces of columns, walls and arrises:

.1 6.4 mm (1/4") in 3 m (10’).

.2 9.6 mm (3/8") in a storey height not to exceed 6 m (20’).

.3 12.7 mm (1/2") in 12 m (40’) or more.

.2 Maximum variation from plumb for external corners, expansion joints and other conspicuous lines:

.1 6.4 mm (1/4") in any story or 6 m (20’) maximum.

.2 12.7 mm (1/2") in 12 m (40’) or more.

.3 Maximum variation from level of grades for exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines:

.1 6.4 mm (1/4") in any bay or 6 m (20’).

.2 12.7 mm (1/2") in 12 m (40’) or more.

.4 Maximum variation from plan location of related portions of columns, walls and partitions:

.1 12.7 mm (1/2") in any bay or 6 m (20’).

.2 19 mm (3/4") in 12 m (40’) or more.

.5 Maximum variation in cross-sectional dimensions of columns and thicknesses of walls from dimensions shown on drawings:

.1 Minus 6.4 mm (1/4").

.2 Plus 12.7 mm (1/2").

.6 Where masonry surfaces serves as substrate for thin-set tile and direct applied and insulated finish coatings, build to tolerance of 3.2 mm in 2440 mm (1/8" in any 8’) under a straight edge.

3.3 Laying Masonry Units

.1 Coursing design:

.1 Concrete masonry units:

.1 Fifty percent running bond.

.2 Architectural concrete masonry units:

.1 Interior: Fifty percent running bond.

.2 Exterior: Fifty percent running bond.

.2 Installation and materials shall meet or exceed that of accepted samples and mock-up.

.3 Units shall be cut only upon acceptance of Contract Administrator. Walls are to be laid-up with full size masonry units.

.4 Keep cavity space at cavity and/or veneer walls clear of mortar droppings and debris.

.5 Remove loose and foreign materials from supporting bed surfaces to ensure bonding.

.6 Do not tooth at wall terminations. Rake back 1/2 unit length where stop-off occurs in horizontal run of masonry.

.7 Do not install masonry units with face or faces exhibiting chips, cracks, blemishes, texture variation, and other imperfections detracting from appearance when viewed from distance of 4600 mm (15').

.8 Do not install defective, cracked, and broken masonry units.

.9 Mixing and blending: Mix units from a minimum of 3 pallets to ensure uniform blend of colour and texture and comply with manufacturer's recommended installation requirements. Distribute masonry units of varying textures to avoid spotty appearance over wall surfaces exposed to view. Do not use units which contrast too greatly with overall range.

.10 Maintain bracing of walls and piers continuously during construction until structure provides support.

.11 Locate bearings and piers as indicated. Provide solid masonry units at bearings. Grout under bearing plates installed on masonry with non-shrink grout.

.12 Extend masonry and partitions to deck, slab or structural members, as applicable, except where otherwise noted in the Contract Documents. Incorporate both lateral support and deflection space at termination of walls as required by this section.

.13 Grouted reinforced masonry: incorporate reinforcing steel and construct masonry to indicated requirements.

.14 Lay masonry level, true to line, square, plumb, and as indicated. Lay masonry courses in vertical alignment to ensure vertical joints align for full height of masonry and full height of building face.

.15 Lay masonry in full bed of mortar, properly jointed with other work. Buttering corners of joints, and deep or excessive furrowing of mortar joints are not permitted.

.16 Fully bond intersections, and external corners.

.17 Do not adjust masonry units after placement. Where resetting of masonry is required, remove units, clean and reset in new mortar.

.18 Cut masonry around obstructions, leaving maximum joint size as specified in this section (below).

.19 Build chases, do not cut them.

.20 Lay hollow concrete masonry units so that shells rest and align.

.21 Exposed cuts shall be made clean and true with a suitable masonry saw.

3.4 Exposed Masonry

.1 Do not lay chipped, cracked, blemished, and otherwise damaged units whether exposed or concealed.

.2 Do not lay concrete masonry units that will appear smooth or slick where exposed to view, whether painted or not finished.

.3 Remove chipped, cracked, and otherwise damaged units and replace with undamaged units.

.4 Maintain and control water-to-cement ratio, rate of hydration, environmental conditions, tooling of the mortar joints, and cleaning procedures, to produce masonry of uniform appearance matching accepted mock-up.

3.5 Jointing

.1 Form tooled mortar joints whenever exposed to view, and behind cabinets, fitments, and wall accessories. Tool when mortar is thumb-print hard by tools having long bearing surface to avoid uneven depressions. Close cracks and crevices.

.2 Tool with non-staining pointing tool to provide smooth, compressed, uniformly formed joints as follows:

.1 For exposed concrete unit masonry: Concave.

.2 For exposed architectural concrete unit masonry: Concave.

.3 For concealed masonry: strike flush joints concealed in walls and joints in walls to receive plaster, stucco, tile, insulation, resilient bases, or other applied material except paint or similar thin finish coating. Ensure that no mortar protrudes from joints on wall surfaces to receive materials and coatings.

.4 Joint thickness:

.1 Maintain mortar joint thickness of 10 mm (3/8"), unless otherwise specified or indicated.

.2 At masonry cut around obstructions: maximum joint size of 13 mm (1/2").

.3 Make joints of uniform thickness with vertical joints in alignment.

.4 Trowel point joints in unparged masonry at below grade locations in contact with earth.

.5 Form reglets where indicated for metal flashing in masonry.

.6 Remove loose or defective mortar when masonry is removed and replace.

.7 Rake out joints at junctions of masonry with concrete walls and columns, and at intersection of masonry walls and partitions where joint reinforcement is installed. These joints shall be sealed in accordance with Section 07 92 00.

3.6 Built-In Work

.1 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.

.2 Coordinate and cooperate in the provisions for setting, anchorage and alignment of built-in work.

.3 Metal door frames:

.1 Build masonry around metal door frames.

.2 Ensure that anchors are secured solidly, and that frames are true and plumb.

.3 Fill back void of frames with Type N or S mortar unless otherwise indicated.

.4 Protect frame with protective covering and leave no mortar on exposed frame faces.

3.7 Reinforced Masonry

.1 Conform to requirements of CAN/CSA A371-14.

.2 Grout beneath bearing plates: Fill voids beneath steel bases bearing on masonry with approved non-shrink grout having minimum compressive strength at 28 days cure time of 35 MPa. In addition, use non-ferrous grout where grout is exposed to view, in-service moisture conditions, and weather.

.3 Reinforced block lintels:

.1 Install reinforced block lintels over doorways, other openings and recesses as indicated.

.2 Support masonry units of reinforced block lintels built in place. Provide a level platform, true to the proper elevation and of sufficient strength to support the load without visible deflection. Maintain supports in place for a minimum of 7 days and for a period sufficient to permit the concrete to cure and gain sufficient strength to safely support loads.

.3 Lay masonry units with full mortar coverage on abutting edges with joints shoved tight. Where masonry construction is continued above the lintel, place the first course of masonry units on the lintel in full mortar bed.

.4 Fill voids of masonry units that form the fill depth of lintel beams at one time per beam, with grout having minimum compressive strength at 28 days curing time of minimum 35 MPa.

3.8 Provision for Movement

.1 Deflection space:

.1 Incorporate deflection space between tops of non-load-bearing walls/partitions and structure to prevent transference of structural loads to masonry.

.1 Exterior masonry wall deflection space: 19 mm (3/4").

.2 Interior masonry partition deflection space: 25 mm (1").

.2 Coordinate work of this section with installation of lateral supports.

3.9 Setting of Precast Concrete Components

.1 Generally, conform to requirements specified for concrete block masonry, with modifications as follows.

.2 Receive precast components of Section 03 45 00, including installation requirements.

.3 Clean exposed surfaces of concrete by washing with stiff fibre brush and clean water.

.4 Install anchors and accessories. Set precast plumb, true, level with even bearing on support devices. Completely fill any remaining anchor, dowel and lifting holes with compressible filler.

.5 Make joints uniform and of indicated width. For heavy units likely to extrude mortar from joints, place non-staining resilient cushions at least one joint width back from face to maintain joint width. Set such units and projecting courses after mortar in courses below has hardened sufficiently to support mass.

3.10 Loose Lintels

.1 Loose lintels: Install loose lintels as required to suit required openings. Set and level lintels, centred over opening width, on a 20 mil PVC slip-sheet membrane, placed over bed or mortar. Allow suitable movement joint at ends of lintels for expansion and contraction movement at exterior lintels.

3.11 Lateral Supports

.1 In addition to requirements of Contract Documents, provide horizontal and vertical wall and partition lateral support anchors in accordance with CAN/CSA A370-14.

3.12 Movement (Control) Joints

.1 For masonry without openings, space vertical movement joints at no more than 7620 mm (25') on centre.

.2 For masonry with multiple openings, provide symmetrical placement of movement joints and reduced spacing of no more than 6096 mm (20 ft) on center.

.3 Place movement joints at changes in wall direction, changes in building heights, at door and window locations where necessary and directed, at major changes in thickness of wall.

.4 Extend movement joints to top of masonry, including parapets.

.5 Review and coordinate movement joint locations with the Contract Administrator prior to installation of masonry.

3.13 Temporary Bracing

.1 Provide temporary bracing to masonry walls.

3.14 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00 and perform field control tests in accordance with CSA S304-14.

3.15 Adjusting and Cleaning

.1 Protect masonry and adjacent work from damage from cleaning work.

.2 Clean masonry in accordance with masonry manufacturer's written requirements. Remove masonry and install new masonry, if masonry is damaged by cleaning work.

.3 Use proprietary PH-neutral cleaning solution with water as approved by manufacturer of masonry units in accordance with manufacturer's written directions.

.4 Test cleaning agent and procedures by cleaning small, inconspicuous sample location prior to commencement of overall cleaning work. Review cleaning test area with Contract Administrator and obtain acceptance in writing prior to cleaning remainder of areas requiring cleaning.

.5 Soak wall with clean water and flush off loose dirt and mortar.

.6 Apply specified cleaning agent in accordance with the manufacturer's direction, working from top to bottom.

.7 Rinse areas thoroughly with clean water to remove cleaning solutions, dirt, and mortar residue.

.8 Remove mortar from exposed masonry face immediately after pointing and prior to full set to avoid mortar staining of masonry units. Remove efflorescence and mortar deposits from surfaces to receive coatings and surfaces which are exposed to view. Remove masonry and install new masonry, if mortar staining cannot be removed without damaging masonry work.

.9 Remove mortar droppings from flashings and other materials immediately to prevent damage and discolouration.

.10 Remove efflorescence and mortar deposits from surfaces to receive coatings or surfaces which are exposed to view, occurring within a time period of 1 year after date of Substantial Performance.

3.16 Protection

.1 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

.2 Protect other materials and finishes from contamination by mortar droppings.

.3 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Mortar and grout for masonry work.

.2 Pigmented mortar at following masonry assemblies:

.1 Architectural concrete masonry units.

.3 Mortar with water repellent admixture at walls with concrete block factory treated with water repellent admixture.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00 and Section 04 05 00.

.2 Test and evaluation reports:

.1 Submit test results confirming compliance of aggregates with CAN/CSA A179-14.

.3 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 Mortar and grout: Comply with CAN/CSA A179-14.

.2 Portland cement: in accordance with CSA A3001-18, GU (Type 10). For exposed mortar, maintain uniformity of cement manufacturer and batch for colour uniformity.

.3 Hydrated lime: in accordance with ASTM C207-18, Type S.

.4 Sand: in accordance with CAN/CSA A179-14.

.5 Integral water repellent mortar admixture; for block walls in change rooms and washrooms using block with water repellent admixture:

.1 Integral liquid or dry polymer admixture for mortar added during mixing or at the factory, compatible with integral water repellent admixture used in concrete masonry units.

.2 Water permeance of masonry: capable of achieving a Class E Rating when evaluated using ASTM E514/E514M-20 with the test extended to 72 hours, using the rating criteria specified in ASTM E514/E514M-20.

.3 Maintain Material uniformity with integral water repellent admixture used in concrete masonry units.

.4 Acceptable Materials:

.1 In accordance with architectural concrete masonry unit manufacturer's written requirements. Refer to Section 04 22 23.

.6 Mortar pigment:

.1 Pure, concentrated mineral pigments especially processed for mixing into mortar and in accordance with ASTM C979/C979M-16.

.2 Permanent, inert, stable to atmospheric conditions, sun-fast, weather-resistant, alkali-resistant, water-insoluble, lime-proof, and non-bleeding.

.3 Pigments made of carbon black are not acceptable.

.4 Colour pigment weight: maximum 10% of cement weight.

.5 Allow for blended mortar pigment colours to match each type of exposed masonry unit.

.1 Colours: to be selected by Contract Administrator.

.1 Colours shall be selected from full pricing range.

.6 Acceptable manufacturers:

.1 Davis Colors 'True Tone Sweet 16 Cement Colors'.

.2 Lanxess Corporation 'Bayferrox Iron Oxide Pigments'.

.3 Solomon Colors, Inc. 'Concentrated Mortar Colors'.

.4 Spec Mix 'Masonry Cement Sand Pigment'.

.5 Substitutions: in accordance with Section 01 25 00.

2.3 Material Source

.1 Mortar and grout shall be factory prepared premix including sand and colour. Site mixing of bags and sand will not be accepted. Use mortar and grout as supplied by silo batched systems.

.2 Maintain uniformity of mortar material manufacturers, mortar materials and source of aggregate throughout the Work.

2.4 Mortar Types

.1 Mortar for exterior masonry at or below grade: Type S.

.2 Mortar for exterior masonry above grade:

.1 Loadbearing: Type S.

.2 Non-loadbearing: Type N.

.3 Mortar for exterior exposed masonry veneer: Type N, Portland Cement/Lime/Sand mix.

.1 Use water repellent mortar admixture for block walls using block with water repellent admixture.

.3 Mortar for interior masonry:

.1 Loadbearing: Type S.

.2 Non-loadbearing: Type N.

2.5 Mortar Colour

.1 Mortar colour; for use as indicated:

.1 Exterior masonry:

.1 White, to match Spec Mix ‘SM210 Bright White’ except where otherwise noted.

.2 Charcoal, at areas of grey architectural concrete masonry units.

.2 Interior masonry:

.1 White, to match Spec Mix ‘SM210 Bright White’ at architectural concrete masonry units.

.2 Grey mortar.

.3 Except where pigmented mortar is specified or indicated: Control mortar materials and workmanship to produce uniform grey colour (non-pigmented).

2.6 Grout Types

.1 Grout for masonry: Grout in accordance with CAN/CSA A179-14.

.1 Compressive strength in accordance with CAN/CSA A179-14 except where indicated otherwise and except as follows:

.1 Beneath bearing plates: 35 MPa.

.2 Slump: 200 mm (8") unless otherwise indicated.

.2 Grout for hollow metal frames: Fine grout in accordance with CAN/CSA A179-14.

.1 Compressive strength: 15 MPa minimum.

PART 3 - EXECUTION

3.1 Masonry Procedures

.1 Masonry procedures shall be in accordance with Section 04 05 00 as supplemented herein.

.2 Comply with CAN/CSA A179-14, except where indicated otherwise.

3.2 Measurement and Mixing

.1 Mix mortars and grout as specified in CAN/CSA A179-14. Use only dry aggregate. Test for bulking to determine accurate proportioning.

.2 Adjust water in mortar mix to suit absorption rates of masonry units.

.3 Concrete grout: mix as required to achieve specified compressive strength.

3.3 Grout

.1 Place and grout reinforcing and bearing in accordance with Section 04 05 00, CAN/CSA A371-14, and as indicated.

3.4 Field Quality Control

.1 Field tests and inspections:

.1 Provide mortar for strength testing in accordance with CAN/CSA A179-14 and Section 01 45 00.

.2 For pigmented mortars, in order to maintain uniformity of mortar pigment throughout the Work, make visual inspections of cement shade for each cement delivery and compare against future shipments. Cements exhibiting shade differences such that final colour of pigmented mortar will not be uniform throughout the Work or will not match the approved sample, shall be rejected and replaced at no additional cost to the City.

3.5 Protection

.1 Provide protection where required at mixing areas to prevent damage attributed to materials of this section.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Masonry reinforcing and anchorage.

.2 Connectors for anchorage of masonry veneer to the following support assemblies:

.1 Concrete unit masonry.

.2 Wind bearing metal studs.

.3 Concrete.

.3 Horizontal reinforcing for masonry block wall and partition assemblies.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00 and Section 04 05 00.

.2 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 General: in accordance with building code and CAN/CSA A370-14.

.2 Corrosion protection; metal materials: in accordance with building code and CAN/CSA A370-14:

.1 For metal located interior to air barrier location: Hot dipped after fabrication in accordance with ASTM A1064/A1064M-22, and ASTM A153/A153M-16a Class B2 (457 g/m^2), mill galvanized.

.2 For metal located exterior to the air barrier membrane: Stainless steel Type 304/316.

.3 Joint reinforcement:

.1 Acceptable manufacturers:

.1 Blok-Lok.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Exterior wall assemblies: 4.75 mm (3/16") wire, welded rod, ladder design unless otherwise indicated.

.3 Interior wall assemblies: 9 gauge mill galvanized wire ladder reinforcement.

.4 Exterior masonry veneer connectors for connection to concrete back-up:

.1 Description: Stainless steel in accordance with ASTM A666-23, Type 304 or 316 plate construction, wire V-TIE or TRI-TIE masonry veneer connector, minimum 4.76 mm (3/16") cold drawn stainless steel Type 304 or 316 in accordance with ASTM A580/A580M-23, stainless steel or polyethylene insulation securement plates for insulation:

.2 Acceptable Materials:

.1 Fero Thermal Tie 'Slotted Rap-Tie/Holed RAP Tie'.

.2 Substitutions: in accordance with Section 01 25 00.

.5 Exterior masonry veneer connectors for connection to concrete masonry unit back-up:

.1 Description: Stainless steel in accordance with ASTM A666-23 Type 304 or 316 formed plate construction, wire V-TIE or TRI-TIE masonry veneer connector (4.76 mm (3/16") cold drawn stainless steel Type 304 or 316 in accordance with ASTM A580/A580M-23, stainless steel or polyethylene insulation securement plates for insulation sheathing:

.2 Acceptable Materials:

.1 Fero Thermal Tie 'Slotted Block Tie (Type 1) /Block Shear Connector'.

.2 Substitutions: in accordance with Section 01 25 00.

.6 Masonry veneer connectors; stud back-up (installed on top of air barrier membrane and sheathing material):

.1 Description: Stainless steel in accordance with ASTM A666-23 Type 304 or 316 plate construction, wire V-TIE or TRI-TIE masonry veneer connector (4.76 mm (3/16") cold drawn stainless steel Type 304 or 316 in accordance with ASTM A580/A580M-23, stainless steel or polyethylene insulation securement plates for insulation sheathing:

.2 Acceptable Materials:

.1 Fero Thermal Tie 'Heavy Duty Holed RAP Tie' including insulation support.

.2 Substitutions: in accordance with Section 01 25 00.

.7 Masonry ties and connectors for insulation thicknesses exceeding manufacturer's standard lengths.

.1 Provide masonry reinforcing, ties, and connectors in accordance with engineered design and CAN/CSA A370-14.

.8 Shelf angle support systems: bracket system consisting of brackets, washers, fasteners and required accessories.

.1 Hot dipped galvanized in accordance with ASTM A153/A153M-09 and CAN/CSA A370.

.2 Acceptable Materials:

.1 Fero 'FAST Thermal Bracket' system.

.2 Substitutions: in accordance with Section 01 25 00.

PART 3 - EXECUTION

3.1 Masonry Reinforcing, Ties, and Connectors - Engineered Applications

.1 Install masonry reinforcing, ties, and connectors in accordance with engineered design and CAN/CSA A371-14.

3.2 Movement (Control) Joints

.1 Installation requirements in accordance with Section 04 05 00 and as supplemented herein.

.2 Stop reinforcing 25 mm (1") short of each side of movement joints unless otherwise indicated.

3.3 Masonry Veneer Connectors

.1 Tie masonry veneer to structural backing in accordance with CAN/CSA A179-14, CSA S304-14, CAN/CSA A370-14, CAN/CSA A371-14, and as indicated on engineered shop drawings.

3.4 Bolts and Anchors

.1 Embed bolts and anchors solidly in mortar or grout to develop maximum resistance to design forces.

3.5 Lateral Support and Anchorage

.1 Install lateral support and anchorage in accordance with CAN/CSA A370-14 and as indicated on the structural drawings.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Movement (control) joint filler at masonry veneer.

.2 Preformed movement (control) joint filler at concrete walls/partition assemblies.

.3 Weep vents at cavity masonry veneer.

.4 Cavity drainage material at exterior masonry cavity walls.

.5 Metal flashing at masonry wall assemblies.

.6 Cavity firestopping materials at exterior cavity masonry wall assemblies.

.7 Deflection space filler at top of non-fire rated masonry partitions.

.8 Deflection space filler at top of fire-rated masonry partitions.

.9 Isolation filler strips at acoustical masonry partitions termination gaps.

.10 Slip-sheet membrane for steel lintel bearing over masonry to allow lintel movement (thermal expansion/contraction).

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00 and Section 04 05 00.

.2 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 Movement (control) joint filler at masonry veneer: sealant and backer rod in accordance with Section 07 92 00.

.2 Preformed movement (control) joint filler; concrete block wythes, PVC:

.1 Acceptable Materials:

.1 Blok-Lok 'VS Series'.

.2 Hohmann & Barnard 'VS Series'.

.3 Substitutions: in accordance with Section 01 25 00.

.3 Weep vents:Full height of masonry unit, designed to keep weep hole open for passage of air and water, UV stabilized polypropylene.

.2 Size: Height of head joint x depth of masonry unit x thickness of mortar joint.

.3 Colour: to later selection by Contract Administrator from manufacturer's full range.

.4 Acceptable Materials:

.1 Advanced Building Products, Inc. 'Mortar Maze Weep Vents.

.2 Blok-Lok Limited 'Cell-Vent'.

.3 Mortar Net Solutions 'WeepVent'.

.4 Wire-Bond 'Cell-Vent'.

.5 Substitutions: in accordance with Section 01 25 00.

.4 Cavity drainage material: Free-draining mesh made from polymer strands or extruded polypropylene formed cavity units to suit cavity depth, that will not degrade within the wall cavity.

.1 Basis of design:

.1 Mortar Net Solutions 'MortarNet with Insect Barrier'.

.5 Masonry flashing: air barrier flashing membrane in accordance with Section 07 27 00, full width (roll) to suit conditions at the Site.

.6 Masonry through wall flashing:

.1 Sheet membrane:

.1 Single source responsibility: Components required for complete air barrier system and through wall flashing membrane behind the opaque wall assemblies to be obtained from single manufacturer. Coordinate with Section 07 27 00.

.2 Primer: as per manufacturer's installation requirements.

.3 SBS rubberized asphalt compound integrally laminated to cross laminated polyethylene film.

.4 Overall thickness: 1 mm (40 mils).

.5 Film thickness: 0.203 mm (8 mils).

.6 Service temperature: -40 °C to 70 °C.

.7 Acceptable Materials:

.1 Carlisle Coatings & Waterproofing ‘CCW-705 TWF’.

.2 GCP Applied Technologies ‘Perm-A-Barrier Wall Flashing’.

.3 Henry Company ‘Bakor Blueskin TWF'.

.4 Soprema ‘Sopraseal Stick 130-S’.

.5 W.R. Meadows ‘Air-Shield Thru-Wall Flashing’.

.6 Substitutions: in accordance with Section 01 25 00.

.7 Metal flashing:

.1 Steel sheet, 0.457 mm (26 gauge SWG) minimum thickness, commercial quality in accordance with ASTM A653/A653M-11 with Z275 designation zinc coating, silicone modified polyester finish, 2-coat system, colour as selected by Contract Administrator.

.2 Flashing between shelf angle and through wall flashing for bridging over insulation to connect to air barrier system in accordance with 07 27 00.

.8 Cavity firestopping materials: Mineral type in accordance with Section 07 84 00.

.9 Deflection space filler (non-fire rated walls):

.1 Acceptable Material:

.1 CertainTeed ‘Lanaé NoiseReducer’.

.2 Johns Manville ‘Sound-SHIELD’.

.3 Owens-Corning ‘QuietZone’.

.4 Rockwool ‘AFB evo’.

.5 Substitutions: in accordance with Section 01 25 00.

.10 Deflection space filler (fire rated walls): Mineral type in accordance with Section 07 84 00.

.11 Isolation filler strips at acoustical wall:

.1 Closed cell neoprene, minimum 12 mm (1/2") thick, in accordance with ASTM D1056-14 Class RE41.

.2 Acceptable Material:

.1 Blok-Lok ‘NS Neoprene Sponge’.

.2 Substitutions: in accordance with Section 01 25 00.

.12 Slip-sheet flashing membrane (for loose lintel bearing locations):

.1 Minimum 0.5 mm (0.020”) thick, PVC membrane, low temperature flexible to 40°C below zero.

.2 Acceptable Materials:

.1 Blok-Lok ‘Flex-Flash’.

.2 Lexcor F20.

.3 Substitutions: in accordance with Section 01 25 00.

PART 3 - EXECUTION

3.1 Masonry Installation and Procedures

.1 Masonry installation and procedures shall be in accordance with Section 04 05 00, as supplemented herein.

3.2 Movement (Control) Joints

.1 Installation requirements in accordance with Section 04 05 00 and as supplemented herein.

.2 Keep movement joints clear for application of joint sealants.

.3 Install movement joint filler in accordance with product manufacturer's written requirements.

3.3 Vents

.1 Install weep vents in vertical joints at bottom of walls immediately over flashings, in exterior wythes of cavity wall and masonry veneer wall construction, at uniform and consistent horizontal spacing not exceeding 610 mm (24"). Do not locate vents within 610 mm (24") adjacent to corners of buildings.

.2 Install weep vents at top at cavities, at second brick course from top, at uniform and consistent horizontal spacing not exceeding 610 mm (24").

.1 Stagger vents below upper floor level vents to ensure that upper vents are not located directly over lower vents, in consistent arrangement reviewed and accepted by Contract Administrator prior to commencement of installation.

.2 Do not locate at window sills.

.3 Do not locate at top of parapet cavities.

.4 Do not locate within 610 mm (24") of corners of building.

3.4 Masonry Flashing

.1 General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

.2 Install flashing as follows unless otherwise indicated:

.1 Install flashings in masonry in accordance with CAN/CSA A371-14.

.2 Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal laps and penetrations in flashing watertight in accordance with manufacturer’s installation requirements.

.3 At lintels and shelf angles, extend flashing a minimum of 150 mm (6") into masonry at each end. At heads and sills, extend flashing minimum of 150 mm (6") at ends and turn up 50 mm (2") minimum to form end dams.

.4 Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 12.7 mm (1/2") back from outside face of wall and adhere flexible flashing to top of metal drip edge.

.5 Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

.6 Flashings shall be installed to shed water in masonry cavity to exterior. Make flashings watertight.

.7 Install masonry flashing to perform as dampproof course in walls that extend below grade except walls which are not exposed to moisture or protected by moisture retarding materials. Locate no less than 150 mm (6") above finished grade.

3.5 Cavity Firestopping

.1 Friction fit cavity firestopping in accordance with manufacturer's installation requirements.

.2 Locate and install in continuous rows at maximum horizontal spacing of 20 m (65'7") on centre.

3.6 Cavity Drainage Material

.1 Install cavity drainage units over weep hole vents, flashings, in exterior wythes of masonry cavity and veneer wall construction.

.2 Install free-draining mesh units in continuous manner for full cavity length and depth.

3.7 Deflection Space Filler

.1 Non-fire rated walls: Fill deflection space with deflection space filler. Where deflection space is exposed, tamp filler into deflection space 25 mm (1").

.2 Fire-rated walls: Refer to requirements of Section 07 84 00.

3.8 Slip Sheet at Metal Lintels

.1 Install slip sheet at loose lintel locations between bearing area of lintel and bed. Trim away exposed slip sheet.

3.9 Isolation Filler Strips at Acoustical Walls

.1 Install continuous neoprene foam isolation filler strips at non-bearing condition between block wall and concrete walls, floors, lateral anchors, and ceilings, to prevent flanking of sound vibrations from concrete block to cast-in-place concrete.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Concrete masonry units:

.1 Light weight units.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00 and Section 04 05 00.

.2 In-situ carbon dioxide mineralization verification:

.1 Provide concrete masonry producer's verification of in-situ mineralization of carbon dioxide.

.3 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 Concrete masonry units (CMU):

.1 In accordance with CAN/CSA A165 SERIES-14.

.2 In-situ carbon dioxide mineralization:

.1 Supply concrete masonry units that have undergone in-situ carbon dioxide mineralization, such that post-industrial carbon dioxide (CO2) is injected into the concrete during mixing and chemically converted into a mineral.

.2 Acceptable technologies:

.1 CarbiCrete.

.2 CarbonCure Technologies Inc.

.3 Carboclave.

.3 Include shapes, such as end, bond, sash groove, ledge and lintel units, required to complete the Work, with uniform appearance.

.1 Provide open end blocks where vertical reinforcing occurs in walls.

.2 Provide knock-out blocks where horizontal reinforcing bars occur in walls.

.3 Provide bullnose units at interior partition outside corners and where indicated.

.4 Solid concrete masonry units may be used where grouted block is indicated, whenever reinforcing is not indicated, in lieu of grouted solid installation method.

.5 Size: metric.

.4 Light weight units:

.1 Hollow units: H/15/C/M.

.2 Semi-solid units: SS/15/C/M.

.3 Full solid units: SF/15/C/M.

.4 Colour: grey.

.5 Profiles: as indicated.

2.3 Source Quality Control

.1 Perform tests on masonry units to determine compressive strength as required by jurisdictional authorities in accordance with CAN/CSA A165 SERIES-14.

PART 3 - EXECUTION

3.1 Preparation

.1 Before commencing masonry work, verify that conditions at the Site will allow construction of masonry within required limitations for wall heights, wall thicknesses, openings, bond, anchorage, lateral support, and compressive strengths of masonry units and mortars.

3.2 Masonry Procedures

.1 Lay masonry in accordance with good practice and CAN/CSA A371-14, as accepted in mock-up sample wall and in accordance with Section 04 05 00.

.2 Exposed corners at interior partitions shall utilise units with bullnose corners. At exterior exposed corners, extent of bullnose to be as indicated.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Architectural concrete masonry units, interior and exterior.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00 and Section 04 05 00.

.2 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Architectural Concrete Masonry Units - Exterior

.1 Architectural concrete masonry units (architectural block): in accordance with CAN/CSA A165 SERIES-14:

.1 Size: 90 mm x 90 mm x 390 mm.

.2 Basis of design:

.1 Day & Campbell 'Modern Masonry Architectural Line'.

.1 Finish: Honed.

.2 Colours:

.1 ACMU1: Super White.

.2 ACMU2: Darker grey, to later selection by Contract Administrator.

.3 Acceptable alternate:

.1 Richvale York 'Cambridge Series'.

.1 Finish: Ground face.

.2 Colours:

.1 ACMU1: Arctic White.

.2 ACMU2: Darker grey, to later selection by Contract Administrator.

.2 Special shapes:

.1 Include L-shaped corner units at door openings, window openings and corners.

.1 Size: 90 mm x 190 mm x 390 mm.

.2 Lip stretcher blocks: Factory cut to required dimensions.

2.3 Architectural Concrete Masonry Units – Interior (ACMU1)

.1 Architectural concrete masonry units: in accordance with CAN/CSA A165 SERIES-04:

.1 Size: Refer to Material Schedule.

.2 Basis of design: Day & Campbell 'Modern Masonry Architectural Line'.

.1 Finish: Honed.

.2 Colours: Refer to Material Schedule.

.3 Provide masonry units with integral water repellent admixture at change rooms and washrooms, or as indicated.

.1 Water permeance of masonry: capable of achieving a Class E Rating when evaluated using ASTM E514/E514M-20 with the test extended to 72 hours, using the rating criteria specified in ASTM E514/E514M-74.

.2 Special shapes:

.1 Provide bullnose units at exposed outside corners in public areas and where indicated.

PART 3- EXECUTION

3.1 General

.1 Lay masonry in accordance with good practice, and CAN/CSA A371-14 and as accepted in mock-up sample wall specified in Section 04 05 00.

.2 Do not use salt to thaw ice formed on surface of units.

3.2 Cutting of Units

.1 Cut masonry units with wet-saw.

.2 Pre-soak units using clean water prior to cutting.

.3 Clean cut units using a stiff fibre brush and clean water. Allow units to surface dry prior to placement.

3.3 Tolerances

.1 Variation in alignment from unit to adjacent unit: 1.5 mm (1/16") maximum.

.2 Variation of mortar joint thickness: 3 mm every 1000 mm (1/8" every 36").

3.4 Adjusting and Cleaning

.1 Clean masonry as work progresses. Allow mortar droppings on masonry to partially dry then remove by means of brushing with a stiff fibre brush.

.2 Post-Construction: Clean mock-up panel as directed below and leave for one week. If no harmful effects appear and after mortar has set and cured, clean masonry as follows:

.1 Protect windows, sills, doors, trim and other work from damage.

.2 Remove large particles with stiff fibre brushes without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.

.3 Scrub with solution approved by masonry unit manufacturer, then clean off immediately with clean water using hose.

.4 Repeat cleaning process as often as necessary to remove mortar and other stains.

.3 Use alternative cleaning solutions and methods for difficult to clean masonry only after consultation with masonry unit manufacturer.

3.5 Protection

.1 Protect masonry units from damage resulting from subsequent construction operations.

.2 Use protection materials and methods which will not stain or damage masonry units.

.3 Remove protection materials upon Substantial Performance, or when risk of damage is no longer present.

END OF SECTION

PART 1 - GENERAL

1.1 Definitions

.1 The following Definitions shall apply in this Specification:

.2 Contract Documents

.1 The Contract Documents consist of the Drawings, Specifications and Reports which form part of the agreed Contract.

.3 Contract Administrator

.1 The Contract Administrator is the Architect, SEOR, persons or entities engaged by the City. The term Contract Administrator means the Contract Administrator or the Contract Administrator's authorized representative.

.4 Contractor

.1 The term Contractor is defined to include any of the following: Construction Manager, General Contractor, Structural Steel Erector, Structural Steel Fabricator, Subcontractor or Supplier.

.5 City

.1 The City is the person or entity identified as such in the Contract. The term City means the City or the City's authorized agent or representative, but does not include the Contract Administrator.

.6 SEOR

.1 The SEOR is defined as the Structural Engineer of Record for the Contract.

1.2 Work Included

.1 Comply with Division 1 - General Requirements and all documents referred to therein.

.2 Provide all labour, materials, plant and equipment to complete the structural steel Work indicated in the Contract Documents and specified in this Section.

.3 It is the responsibility of the Contractor to verify the availability of the steel sections specified in the Contract Documents at time of tender, and to immediately notify the Contract Administrator if any of the steel sections are not readily available and need to be substituted. Substitutions made after tender will be at the expense of the Contractor.

.4 It is the responsibility of the Contractor to verify that steel members which are shown to be curved or cranked in the Contract Documents, can be fabricated as shown without any reduction in the load carrying capacity of the member. If curved or cranked steel members cannot be fabricated as shown in the Contract Documents, the Contractor shall identify, at the time of tender, which steel members cannot be fabricated as shown in the Contract Documents, and to propose alternative steel sections for consideration by the Contract Administrator. Any cost associated with any alterations to such members identified after tender will be at the expense of the Contractor.

1.3 Section Includes

.1 This Section includes: Structural steel framing members, architecturally exposed structural steel, joists, high rise construction, and qualification requirements.

1.4 Related Work Specified Elsewhere

.1 Section 03 20 00 - Concrete Reinforcement: Concrete reinforcement.

.2 Section 03 30 00 - Cast-in-Place Concrete: Cast-in-Place concrete and Grouting beneath column bases and bearing assemblies on concrete members.

.3 Section 04 04 15 - Masonry Anchorage and Reinforcement: Anchors for casting into concrete and embedding into masonry.

.4 Section 05 31 10 - Steel Deck:

.5 Reinforcement of edges of openings in steel deck that are not larger than 450 mm in roof deck and 300 mm in floor deck.

.6 Section 09 91 00 - Painting: Painting.

1.5 Reference Standards, Codes, And Acts

.1 Conform to the requirements of the local building code identified on the Structural General Notes as amended by all subsequent Regulations issued to the date of this Specification and applicable acts of authorities having jurisdiction.

.1 All references to the Standards and publications noted below shall be to the edition referenced in the local building code identified on the Structural General Notes, or to the edition referenced in the latest published editions or revisions of all Standards published by the Canadian Standards Association issued to the date of this Specification, whichever is the later edition or revision.

.2 All references noted below, which are not referenced by the local building code or the Standards published by the Canadian Standards Association, shall be to the latest edition and revision published to the date of this Specification.

.3 Standards and publications referenced by the Standards noted below shall apply even if they are not included in the list. Where such reference is made, it shall be to that latest edition and revision published to the date of this Specification.

.4 Where there are differences between the Contract Documents and the standards, codes or acts, the most stringent shall govern.

.2 ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.

.3 ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.

.4 ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.5 ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.6 ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

.7 ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

.8 ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.

.9 ASTM A992/A992M - Standard Specification for Structural Steel Shapes.

.10 ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

.11 ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts (Metric).

.12 ASTM D621 - Test Methods for Deformation of Plastics Under Load.

.13 ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

.14 ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

.15 ASTM F959/F959M - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners, Inch and Metric Series.

.16 ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

.17 ASTM F3043 - Standard Specification for “Twist Off” Type Tension Control Structural Bolt/Nut/Washer Assemblies, Alloy Steel, Heat Treated, 200 ksi Minimum Tensile Strength.

.18 ASTM F3111 - Standard Specification for Heavy Hex Structural Bolt/Nut/Washer Assemblies, Alloy Steel, Heat Treated, 200 ksi Minimum Tensile Strength.

.19 ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, Metric Dimensions 830 MPa and 1040 MPA Minimum Tensile Strength.

.20 AWS D1.1/D1.1M - Structural Welding Code - Steel.

.21 CISC Code of Standard Practice - CISC Code of Standard Practice for Structural Steel.

.22 CISC Guide for Specifying Architecturally Exposed Structural Steel - CISC Guide for Specifying Architecturally Exposed Structural Steel.

.23 CISC/CPMA 1-73a - Standard 1-73 - Canadian Institute of Steel Construction and Canadian Paint Manufacturers Association.

.24 CISC/CPMA 2-75 - Standard 2-75 - Canadian Institute of Steel Construction and Canadian Paint Manufacturers Association.

.25 CSA G40.20/G40.21 - General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.

.26 CSA S16 - Design of Steel Structures.

.27 CSA W47.1 - Certification of Companies for Fusion Welding of Steel.

.28 CSA W59 - Welded Steel Construction.

.29 EN 15804 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

.30 ISO 14025 - Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures.

.31 ISO 14040 - Environmental management -- Life cycle assessment -- Principles and framework.

.32 ISO 14044 - Environmental management -- Life cycle assessment -- Requirements and guidelines.

.33 ISO 21930 - Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services.

.34 NBC User's Guide - Structural Commentaries - User's Guide National Building Code (NBC) Part 4 of Division B.

.35 Ontario Professional Engineers Act - Ontario Professional Engineers Act.

.36 Specification for Structural Joints Using ASTM A325 or A490 Bolts - Research Council on Structural Connections (RCSC) - Specification for Structural Joints Using ASTM A325 or A490 Bolts.

.37 SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer.

.38 SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic").

.39 SSPC-SP 2 - Hand Tool Cleaning.

.40 SSPC-SP 3 - Power Tool Cleaning.

.41 SSPC-SP 6 - Commercial Blast Cleaning.

.42 SSPC-SP 7 - Brush-Off Blast Cleaning.

.43 SSPC-SP 10 - Near-White Blast Cleaning.

.44 ULC (FRD) - Fire Resistance Directory.

1.6 CISC Code Of Standard Practice For Structural Steel

.1 The CISC Code of Standard Practice shall govern the Work, subject to the modifications noted below.

.1 Revise Clause 1.4 Responsibility for Design as follows:

.1 **Clause 1.4: Responsibility for Design.** When the City provides the structural Drawings and Specifications, the Contractor shall not be responsible for determining the adequacy of the design nor liable for the loss or damage resulting from an inadequate design. *The SEOR shall be responsible for the overall behaviour of the structure, the sizing of steel members and their supports as required by the Building Code and the provision of connection forces indicated on the structural Drawings. The Contractor shall be responsible for the design and detailing of all connections and components, members and standardized assemblies. (See also Clause 5.6.)*

.2 Add the following to Clause 1.5, Responsibility for Erection Procedure:

.1 **Clause 1.5: Responsibility for Erection Procedure.** The Contractor shall ensure that in the event the Fabricator's contract does not include the erection of the structural steel, the Erector shall be responsible for determining the erection procedure, for checking the adequacy of the connections for the uncompleted structure, for providing erection bracing or connection details and for coordinating the erection of the steelwork with the Fabricator.

.3 With respect to Clause 3.3 Revisions to the Contract Documents, revise Clause 3.3.4 as follows:

.1 **Clause 3.3.4:** Unless specifically stated to the contrary, the issue of revision documents or changes indicated on submittal reviews is not authorization by the City to release these revisions for construction. Any and all revisions to the Contract shall be made in accordance with the provisions set out in the Contract Documents, and will be based on the Contractor's assessment of the impact of the proposed revisions on the Contract Price and schedule for completion of the Work.

.4 Revise Clause 3.4, Discrepancies as follows:

.1 **Clause 3.4: Discrepancies.** In case of discrepancies between the structural documents and Documents of other Sections, the documents for the Section responsible for deriving the required information shall govern.

.5 Revise Clause 4.1.1 as follows:

.1 **Clause 4.1.1:** At the time tenders are called, the Contractor shall receive a complete set of the Contract Documents *(including Drawings and Specifications) for all design disciplines and specialty Engineers engaged on the project.* When appropriate, these documents shall include complete structural Drawings, conforming to the requirements for design drawings of the governing technical standard. Structural steel Specifications should include any special requirements controlling the fabrication and erection of the structural steel, surface preparation and coating, and should indicate the extent of non-destructive examination, if any, to be carried out.

.6 Clause 4.1.2, delete the last two words in the last sentence.

.7 Revise Clause 4.2 as follows:

.1 **Clause 4.2: Architectural, Mechanical, Electrical and Additional Specialty Engineers Drawings.** Architectural, mechanical, electrical and additional specialty Engineers Drawings may be used as a supplement to the structural Drawings to define detail configurations and construction information.

.8 Revise Clause 5.6 as follows:

.1 **Clause 5.6: Review of Fabrication and Erection Documents.** Erection diagrams, standard and non-standard connection design details, shop details and fieldwork details shall be submitted for review by the SEOR in accordance with the provisions of the Contract Documents. The submittals will be reviewed and returned in accordance with the provisions of the Contract Documents. The documents will be reviewed on a sampling basis for general conformity with the Contract Documents only. The SEOR's review does not relieve the Contractor, Fabricator, Erector or their engineer(s) of any responsibility for same. (Note: The remainder of this clause, as noted in the CISC Code of Standard Practice, is to be deleted.)

.9 Revise Clause 6.7 as follows:

.1 **Clause 6.7: Inspection of Steelwork**. Should the City wish to have an independent inspection and/or non-destructive examination of the steelwork, they shall reserve the right to do so in the Contract Documents. The Contractor shall notify the inspection and testing company of the progress of the Work so that timely inspection and testing may be arranged. The cost of this inspection and testing is the responsibility of the City. However, deficiencies in the Work of the Contractor requiring re-inspection and re-testing due to the frequency of the deficiency shall be the responsibility of the Contractor.

1.7 Architecturally Exposed Structural Steel

.1 Architecturally exposed steel is all steel which is left exposed to view in the completed building and is noted "AESS" in the Contract Documents. In addition to the requirements of this Section, the requirements of the CISC Guide for Specifying Architecturally Exposed Structural Steel and Appendix I of CISC Code of Standard Practice shall apply, except as varied in this section.

.2 The following definitions apply for the various categories of AESS:

.1 **AESS 1 - Basic Elements:** Suitable for "basic" elements which require enhanced workmanship.

.2 **AESS 2 - Feature Elements Viewed at a Distance > 6 m:** Suitable for "feature" elements viewed at a distance greater than 6 m. The process involves good fabrication practices with enhanced treatment of weld, connection and fabrication detail, tolerances for gaps, and copes.

.3 **AESS 3 - Feature Elements Viewed at a distance ≤ 6 m:** Suitable for "feature" elements – where the Contract Administrator is comfortable allowing the viewer to see the art of metalworking. Welds are generally smooth but visible; some grind marks are acceptable. The structure is normally viewed closer than 6 m and is frequently subject to touching by the public. Tolerances are tighter than normal standards refer to the tolerances clause section of this Specification.

.4 **AESS 4 - Showcase Elements:** Suitable for "showcase or dominant" elements – where the Contract Administrator intends the form to be the only feature showing in an element. All welds are ground, and filled edges are ground square and true. All surfaces are sanded/filled. All surfaces are to be "glove" smooth. Tolerances are generally one-half of normal standard, refer to tolerances clause section of this Specification.

.5 **AESS C - Custom Elements:** Suitable for elements which require a different set of Characteristics than specified in Categories 1, 2, 3 or 4 as defined above.

1.8 Tolerances

.1 Fabricated members and erected structural steel tolerances shall conform to the ones specified in the typical details and CSA S16.

.2 Interfacing tolerances may not be compatible with the above. Review and coordinate interfacing tolerances so that the various elements come together properly.

.3 Fabricating, shall be such that the effects of galvanizing, bending, cambering and the like, on the alignment of the completed members is minimized.

.4 The tolerances of architecturally exposed structural steel members shall not exceed 1/2 of the standard camber and sweep tolerances specified in CSA G40.20/G40.21, unless noted otherwise in the Contract Documents.

1.9 Qualifications

.1 Any organization undertaking to weld shall be certified by the Canadian Welding Bureau to the requirements of Division 1, or Division 2.1 of CSA W47.1.

.2 The Contractor shall ensure that the potential steel Subcontractors can successfully demonstrate that they have sufficient relevant experience of Work similar in size, scope, complexity and risk to that shown on the Contract Documents and described in this Section.

.3 Design calculations shall be carried out by or under the direct supervision of a qualified Professional Engineer licensed in the Province having jurisdiction, with a minimum of 5 years Canadian experience in the design of structural steelwork, connections including design of weldments, or joist systems, as appropriate.

.4 The Contractor shall ensure that engineers responsible for welding design, procedures and practice are certified in accordance with CSA W47.1, section 6.1.

.5 The Contractor shall ensure that professional Engineers responsible for the design of steelwork, connections, joist systems and the like, are insured in accordance with section 74(1) of Regulation 941 of the Ontario Professional Engineers Act or shall be covered under the Contractor's General Liability Insurance Policy. Note: If the professional engineer is insured in accordance with Regulation 941 of the Ontario Professional Engineers Act, the alternative outlined in section 74(2) is <u>not</u> acceptable.

1.10 Design

.1 General

.1 Design connections for the loads indicated or implied in the Contract Documents in accordance with requirements of CSA S16.

.2 If the Contractor requires additional information or clarification to aid in the design of the Work, this information shall be requested in a timely manner.

.2 Connections

.1 The Contractor shall be solely responsible for the design and detailing of all connections between the steel members including, but not limited to columns, beams, girders, trusses and braces, and between such members as spandrel angles and beams, hangers, stiffeners, etc., and their supporting members.

.2 The Contractor shall also be responsible for the design and detailing of stiffeners, doubler plates and the like required to maintain the local strength and stability of a member and where these stiffeners and doubler plates are an integral part of the connection or where they affect the connection of other steel framing members. Examples include cranked sections, moment connections between columns and beams, connections to hollow structural sections and the like. Where connections are exposed to view, the detailing of stiffeners, double plates and the like is subject to review by the Contract Administrator.

.3 Use types of shop or field connections shown on the Contract Documents, or in the absence of such information, use the most appropriate type of connections given the applied loads and the arrangement of members.

.4 Design connections to safely withstand the combined primary effects of axial force, shear, moment and torque and any secondary effects due to welding. Connections shall also safely withstand any temporary loads which may occur during the construction.

.5 Shear connections shall not be less than one half the depth of the connected member.

.6 Where no axial force is indicated for beam to column connections, connect beams framing into columns such that the combined capacities of the connection are able to resist a total horizontal force of 2% of the factored axial load in the column, in any direction. The column bracing force shall be proportioned and resisted by the members framing into the joint according to their relative axial stiffnesses, unless noted otherwise in the Contract Documents.

.7 Unless noted otherwise in the Contract Documents, the design of all beams and girders is based on the assumption that fastener holes through flanges will not exceed 15% of the gross flange area. If the area of holes exceeds 15%, the member size shall be altered or reinforced accordingly. Documentation noting the alteration is to be submitted for review.

.8 Design bracing member connections for field adjustability to accommodate maximum construction tolerances and to achieve bracing preloads where specified in the Contract Documents.

.9 Design hanger connections where bolts are loaded in tension such that they may be locked after pretensioning.

.10 Design connections for fastening together double angles, double rectangular plates or bars, and the like, used to resist compression, tension, or bending in such a way that the slenderness ratio of any component, based on its least radius of gyration and the distance between interconnections, shall not exceed that of the built-up member. As a minimum, provide two intermediate battens or spacers along the length of all members.

.11 The following types of connections are to be designed as slip-critical connections:

.1 Connections that utilize oversized holes;

.2 Connections that utilize slotted holes, except those where the applied load is normal to the long dimension of the slot or in cases where the connection is intended to allow for movement and identified as a vertically or horizontally-slotted connection (VSC/HSC).

.3 Connections subject to fatigue or frequent load reversal or frequent load reversal such as gantries supporting vibrating equipment, structures supporting cranes, external screens/flag poles subject to wind oscillation, and the like

.4 Connections where slippage cannot be tolerated, including;

.1 Connections where welds and bolts share in transmitting shear forces at a common faying surface.

.2 All moment connections, except those with end-plate type connections. Design slip-critical bolted moment connections for 80% of the connection forces (moment and shear) noted in the Contract Documents.

.12 Bolts in the following types of connections are to be pretensioned in accordance with the requirements of CSA S16;

.1 Slip-critical connections,

.2 Connections governed by seismic requirements,

.3 Connections for all elements resisting crane loads,

.4 Connections for members directly supporting running machines or other live loads that produce impact or cyclic load,

.5 Connections where bolts are subject to tensile loads.

.6 Connections using oversized or slotted holes unless specifically designed to accommodate movement.

.13 Design connections that are exposed to weather so that moisture and foreign matter cannot be trapped or gain entry to the interior of hollow built up members.

.14 Design connections that are susceptible to the accumulation of moisture so that moisture and foreign matter cannot be trapped within the connectors or members framing into the connection.

.15 Design and detail connections so they do not encroach upon architectural clearance lines or finishes.

.16 Where connections between beams and columns and the like result in a loss of bearing for the steel deck, design and provide support for the steel deck, as required.

.17 Design and provide end bearing connections of inclined members such that the bearing plane between the inclined members and their supporting members is horizontal.

.18 Design connections to cast in plates to provide for the maximum deviation that can occur in erection and based upon the following:

.1 Specified steel erection tolerances,

.2 Maximum permissible tolerances in the location of inserts cast into concrete, specified in Section 03 10 00 - Concrete Forming.

.3 Joists

.1 Design joists and anchorages for the loads indicated in the Contract Documents and CSA S16.

.2 Bracing and bridging shown on the Drawings is intended as a guideline only. Design and provide bracing and bridging as per the requirements of CSA S16.

.3 Design joist shoes based on the loads and assumed shoe depths noted on the Drawings. If joist shoes of different depths are provided, the Contractor is responsible for any and all revisions this may have on top of steel elevations and the like.

.4 Design the first compression web member subject to transverse shear, and its connections, at each end of joists, in accordance with CSA S16 Clause 16.5.7.3.

.5 Design roof joists, bridging and anchorages to safely resist net uplift forces indicated in the Contract Documents and, in any event, a minimum of 0.5 kPa.

.6 Design roof joists so that the joist stiffness is at least twice the critical stiffness defined in Commentary H, Equation (1) of the NBC User's Guide.

.7 Design joists and connection to joists to safely resist horizontal forces introduced into top chords of joists by horizontal cross-bracing shown on the Drawings.

.8 Design and connect joists to furnish lateral support to the chords or flanges of supporting steel members. Design joists with joist bearing points offset (in plan), such that their reaction is transferred to the centerline of the supporting member. For joists exposed to view, design joists to frame into the supporting member at the same location, with a maximum gap between the ends of adjacent joists of 20 mm.

.9 Provide tie joists for all joists framing into columns, unless noted otherwise on the Drawings. Where tie joists frame into columns, extend top and bottom chords and connect to columns to safely develop one percent of column axial load but not less than 25 kN in tension or compression.

.10 Design anchorage of each line of bridging to abutting walls and other supporting structural steel members to safely resist forces indicated in the Contract Documents, or to at least develop the safe capacity of the bridging members in tension.

.11 Limit roof joist deflection due to specified live loads to L/360 of span.

.12 Where joists span parallel to load bearing walls, limit joist deflection to 2L/360 of span, where L is measured perpendicular to the load bearing wall, from the centerline of the joist to the load bearing wall.

.13 Design joists supporting moveable partitions so that the deflection when subjected to full live load including partitions stacked at any point, or fully extended shall not exceed that required by the manufacturer of the moveable partition.

.14 Camber joists in accordance with the provisions of CSA S16 unless noted otherwise in the Contract Documents.

.15 Adjust stiffness and required camber of joists adjacent to masonry walls, columns, steel beams of shorter span, other joists with different loading or stiffness characteristics and the like to permit the proper fastening of the steel deck. As a guide, limit the deflection of the adjacent joist, under all dead loads, to L/120, where L is the span of the steel deck perpendicular to the joists.

.16 Where ducts or services pass through joists, design and locate web members and bridging connections to accommodate the sizes and runs of ducts and services shown.

.4 Colour Coding

.1 When different grades of steel are supplied, use a colour coding technique to aid in the shop and field identification of these different grades. Each member used shall bear its particular colour code as required by CSA G40.20/G40.21.

1.11 Submittals

.1 Shop Drawings

.1 General

.1 The Contractor shall ensure that professional engineer(s) responsible for the structural steelwork, connections, joist systems and the like shall either:

.1 Seal and sign all necessary shop drawings, or

.2 Submit a sealed and signed letter prior to commencement of shop drawing preparation stating that they have been retained by the steel Fabricator to carry out the design of steel connections, joist systems and the like AND shall submit a second letter after shop drawing preparation is complete stating that the design of the steelwork, for which they are responsible, has been completed in accordance with the Contract Documents and relevant building codes, standards, and acts.

.2 Unless noted otherwise in the Contract Documents, provide adequate space on all shop drawings immediately above the drawings title block for the Contract Administrator's Shop Drawing review stamp. Where requested by the Contract Administrator, the stamp is to be inserted by this section directly into the shop drawing prior to submission. The stamp shall be positioned in the same location on each shop drawing, and in no case shall the allocated space be less than 63 mm x 75 mm. Request the details of these requirements from the Contract Administrator no less than 2 weeks before the commencement of shop drawings.

.3 If the professional engineer(s) choose to seal and sign the shop drawings, as noted above, <u>all</u> shop drawings must be sealed and signed, except for erection diagrams which only contain design information (member sizes, forces, loads and the like) which is indicated on the Contract Documents. If any fieldwork details, notes to the Erector or notifications are made on the erection diagrams, then they must be sealed and signed by the Contractor's engineer.

.4 Reproduction of the structural Drawings, to serve as a basis for the preparation of erection or setting drawings, will be permitted. If the Fabricator and/or Erector make use of the structural Drawings for this purpose, they shall take full responsibility for verifying all information shown on the Drawings and the completeness of the information provided in a manner equivalent to the preparation of erection diagrams. Cost of reproduction of the structural Drawings for this purpose to be paid for by the Contractor. Any identification or reference to the Citys or Contract Administrators is to be removed from all structural Drawings which are used by the Fabricator and erector.

.5 Well in advance of fabrication; submit structural steel connection design details shop, erection, and setting drawings for review by the Contract Administrator. Submit fieldwork details for review by the Contract Administrator.

.6 Shop drawings shall be submitted for all structural steel Work and shall be submitted in complete packages so that individual parts and the assembled unit can be reviewed together. This section and the applicable drawings used in the development of the shop drawings shall be clearly referenced on each shop drawing to facilitate review. Detail member marks shall be cross referenced on the erection drawings to facilitate a quick identification of the members.

.7 When shop drawings are revised and resubmitted, all revisions to the drawings shall be clearly identified by means of “bubbles”, “clouds” or other obvious means.

.8 All shop drawings submitted must clearly indicate the initials of the individual who checked the shop drawings before they were submitted for review.

.2 Connection Design Details

.1 Submit connection design details for review by the Contract Administrator, prior to the submission of the detailed piece drawings.

.2 Connection design details shall be submitted for all standard and non-standard connections, and shall be referenced to the structural Drawings.

.3 Erection Drawings

.1 Submit erection drawings for review prior to preparation of detailed piece drawings.

.2 Erection drawings shall be included with each submission of detailed piece drawings, connection details and calculations.

.3 Erection drawings shall clearly indicate or highlight the member marks that are being submitted for review.

.4 Erection drawings shall clearly show all setting out dimensions for the structural steel frame, including dimensions that have been confirmed by Site measurement. Dimensions shall be tied to relevant grid lines or reference points.

.5 Indicate on erection diagrams steel lintels and other structural shapes which are embedded in masonry or cast-in-place concrete and not connected to structural steel.

.6 Erection drawings shall clearly show all AESS members and their respective Category.

.7 When erection drawings are being submitted for “marks only” or for “reference only”, this shall be clearly indicated on the drawings or transmittal.

.4 Detailed Piece Drawings

.1 Submit detailed piece drawings for all structural members.

.2 As a minimum, show the following:

.1 layout;

.2 member sizes;

.3 connection details, including appropriate reference to connection design calculations;

.4 splice locations and details;

.5 truss details;

.6 holes;

.7 camber;

.8 finishes;

.9 grades of steel;

.10 bolt material and sizes;

.11 weld details, sizes and grade of electrodes:

.12 identify location and extent of all pretensioned bolts, slip critical bolts and class of surface preparation;

.13 clearly identify locations and details of all slip critical connections;

.14 architectural clearance lines and finishes where connections and the like may encroach with other Work.

.15 AESS Category (if applicable)

.3 Submit joist shop drawings for review by the Contract Administrator.

.4 As a minimum, show the following:

.1 specified design loads;

.2 material Specifications;

.3 member sizes;

.4 dimensions;

.5 spacers;

.6 welds;

.7 joist shoes and related details;

.8 anchorages;

.9 bracings;

.10 bearings;

.11 field splices;

.12 bridging locations;

.13 camber;

.14 joist properties, including frequency, for checking floor vibration; and

.15 AESS Category (if applicable).

.5 Fieldwork Details

.1 Submit details for all fieldwork in accordance with the requirements of Division 1 – General Requirements.

.2 The location of fieldwork details shall be clearly identified or referenced on the erection drawings.

.3 Prepare setting drawings showing dimensions and details for setting structural steel bearings, anchorages, assemblies and the like where they interface with other building components.

.4 Co-ordinate structural steel shop and erection drawings with shop drawings of other interfacing Work.

.5 Submit all non-prequalified welding procedures, stamped as approved by the Canadian Welding Bureau and correlated to the appropriate shop and erection drawings.

.6 Furnish inspection company with a copy of each shop, erection, and setting drawing bearing the Contract Administrator's shop drawing stamp marked reviewed.

.6 As-Built Drawings

.1 Mark on a complete set of final drawings any changes, additions, or deletions that occur during construction as a result of the Contractor's Work, change orders or for any other reason.

.2 For all shop drawings marked “Reviewed as Noted” or “Revise and Resubmit”, update and submit a record set of these drawings at the completion of the structural Work. Ensure that these drawings reflect the changes and are coordinated with the final drawings noted above.

.5 Calculations

.1 Submit calculations bearing the seal and signature of the qualified Professional Engineer licensed in the Province having jurisdiction and such further proof as may be necessary to show that non-standard connections, steel joist systems, and the like conform to the requirements set forth in this section.

.6 Cambering Procedures

.1 Submit detailed cambering procedures for beams, girders, trusses, joists and the like for review prior to start of fabrication.

.7 Erection Procedures

.1 Erection procedures and erection bracing are the sole responsibility of the Contractor.

.8 Substitution

.1 It is the Contractor's responsibility to verify the availability of the steel sections shown on the structural Drawings at time of tender, and to immediately notify the Contract Administrator if any of the sections are not readily available and need to be substituted. Substitutions after the time of tender will be at the cost of the Contractor.

.2 If the Contractor wishes to make other substitutions for steel materials or sizes indicated in the Contract Documents, submit proposals with the tender including calculations for review by the Contract Administrator.

.9 Mill Test Certificates

.1 Submit to the Contract Administrator copies of mill test certificates covering chemical and physical properties of steel used in this Work, including mill test reports for all structural bolts, a minimum of 4 weeks prior to commencing fabrication.

.10 Colour Code

.1 Submit colour code proposed or other agreed methods to identify various grades of structural elements.

.11 Non-destructive Testing

.1 Submit all in-house non-destructive testing results of shop and field Work together with inspector/technician certification status and test procedures used.

PART 2 - PRODUCTS

2.1 Materials

.1 Provide only new material manufactured in North American mills or the following international mills Corus UK Ltd (UK), ArcelorMittal S.A. (Luxembourg). free from defects impairing strength and durability. New materials shall be in accordance with the Standards referenced in this Section. Where sections identified are not available from the mills noted or where the Contractor chooses to use sections produced by other mills, provide new materials of minimum strength and minimum quality as indicated in the Contract Documents. For sections that are not produced by North American mills, or additional mills listed above the Contractor shall submit written requests for review of the alternate mill to the Contract Administrator before proceeding with material procurement. The Contract Administrator reserves the right to require physical test data (in addition to the mill test reports) proving that the steel from the proposed mill meets the requirements specified in the Contract Documents. Provide such data for each 100 tonnes of material supplied.

.2 Structural Steel:

.1 Structural wide flange shapes (W) to conform to CSA G40.20/G40.21 grade 350W or ASTM A992/A992M grade 50 (ksi).

.2 Structural welded wide flange shapes (WWF) to conform to CSA G40.20/G40.21 grade 350W.

.3 Angles, plates and channels (L, C) to conform to CSA G40.20/G40.21 grade 300W.

.4 Hollow structural sections (HSS) to conform to ASTM A500/A500M GRADE C.

.3 Anchor Rods: Conform to 300W threaded rod conforming to CSA G40.20/G40.21, unless noted otherwise in the Contract Documents.

.4 Bolts, Nuts and Washers: Conform to ASTM F3125/F3125M, ASTM F3043 and ASTM F3111. Galvanized A325 bolts over 22 mm diameter shall have a dry lubricant on threads such as Johnson's Stick Wax #140 or approved equivalent before installation.

.5 High Strength Bolts: High strength bolts shall be of Canadian or United States manufacture and shall conform to the provisions of the Specification for Structural Joints Using ASTM A325 or A490 Bolts.

.6 Welded Stud Shear Connectors: Headed studs shall be manufactured by Nelson Stud Welding, Inc. (or approved equivalent) and shall be made from mild steel conforming to ASTM A108 grade 1010 through 1020. Headed studs shall be welded per manufacturer's recommendations; mechanical properties of headed studs shall be in accordance with AWS D1.1/D1.1M .

.7 Deformed Bar Anchors: Shall be Nelson, flux filled deformed bar anchors, type D2L, or approved equivalent.

.8 Shop Paint/Primer:

.1 The shop primer or paint shall be compatible with spray fireproofing, intumescent paint and/or the top coat paint system specified in the Contract Documents or elsewhere, where applicable.

.2 Shop Paint: To CISC/CPMA 1-73a or SSPC-Paint 15.

.3 Shop Primer: To CISC/CPMA 2-75.

.9 Minimum coating thickness for Hot Dip Galvanizing shall conform to ASTM A123/A123M.

.10 Inorganic Zinc-Rich Primer: Cathacoat 304V as supplied by Devoe Coatings, an Akzo Nobel N.V. brand (2 to 4 mils dry film thickness), Carbozinc 11 as supplied by Carboline Company (2 to 3 mils dry film thickness), or Zinc Clad II as supplied by The Sherwin-Williams Company (2 to 4 mils dry film thickness); or approved equivalent.

.11 Organic Zinc-Rich Primer: Cathacoat 302HA as supplied by Devoe Coatings, an Akzo Nobel N.V. brand (3 to 4 mils dry film thickness) or Zinc Clad 200 as supplied by The Sherwin-Williams Company (3 to 5 mils dry film thickness); or approved equivalent.

.12 Epoxy Paint: Devran 224HS as supplied by Devoe Coatings, an Akzo Nobel N.V. brand (4 to 6 mils dry film thickness) or Macropoxy 646 Fast Cure Epoxy as supplied by Sherwin-Williams Company (4 to 6 mils dry film thickness); or approved equivalent.

.13 Zinc-Rich Touch-up Paint: Galvafroid as supplied by W. R. Meadows Limited or Zinc Clad 5 as supplied by The Sherwin-Williams Company); or approved equivalent.

PART 3 - EXECUTION

3.1 Fabrication

.1 Provide holes up to 12 mm in diameter, as required, to permit the attachment of other materials. Ensure cross sectional area of section is not reduced by more than 10% at any point on its length.

.2 Provide 20 mm drain holes in closed sections to prevent water build-up during erection. Ensure drain holes remain free to drain throughout construction and are not plugged by subsequent construction activities.

.3 Splices, other than those shown in the Contract Documents, shall not be permitted in members without the Contract Administrator's approval. If approval is given to permit welded splices, they shall be non-destructively tested at no extra cost to the City.

.4 Unless noted otherwise in the Contract Documents, provide a 10 mm cap plate for all hollow members. Provide continuous seal weld around cap plate.]

.5 Cambers

.1 Provide the camber indicated in the Contract Documents to trusses, joists, beams and girders in such a manner as to provide a uniform parabolic profile. Ensure that the method used to provide camber does not reduce the safe load carrying capacity or cause distortion of the members.

.2 Camber stated on the Drawings is the required camber after erection.

.6 Openings

.1 Conform to the requirements indicated in the Contract Documents for location, size, and reinforcement of openings through structural steel.

.2 No openings other than those indicated on the structural Drawings will be permitted without the Contract Administrator's approval.

.7 Holes & Cutting

.1 All holes shall be accurately drilled or punched. Burning or drifting unfair holes will not be permitted. Holes that must be enlarged shall be reamed. Holes for the attachment of Work by other Sections shall be provided as required. Drift pins shall be allowed only to bring together the several parts for connection.

.2 Holes shall be provided in members to permit connections to the Work of other Sections or contracts.

.3 The use of manual gas-cutting in the shop shall be used only if automatic or semi-automatic methods are not possible. Cope for pipes and ducts as indicated in the Contract Documents.

.8 Bolting

.1 Drive bolts accurately into the holes without damaging the threads and heads. Bolts heads and nuts shall rest squarely against metal surfaces.

.2 Where bolts are to be used on beveled surfaces having slopes greater than 1 in 20 with a plane normal to the bolt axis, provide beveled washers to give full bearing to the thread or nut.

.3 Bolt threads of unfinished bolts shall be upset to prevent the nuts from backing off.

.4 Label and ship anchor rods and base plates in sets indicating size and locations of columns and deliver in ample time prior to the start of related concrete Work. Furnish templates together with instructions for setting of anchor rods. Ascertain that anchor rods and other embedded items are set properly during the progress of the Work. Provide 75 mm x 75 mm x 7 mm plate washers between top of base plate and bottom of anchor rod nuts.

.9 Welding of Structural Steel

.1 Pre-weld Inspection

.1 The surface to be welded and the filler material to be used shall be subject to inspection by quality control personnel before welding is performed.

.2 Method and Type

.1 All welding shall be electric arc welding and shall comply in all respects with the codes and Specifications noted in this Section, incorporating the Specifications for design, fabrication, and inspection of welded structures and the qualifications of welders and supervisors. The heat, input, length of weld, and sequence weld and cooling process shall be controlled to prevent distortions.

.2 For weldments comprised of plates in more than one plane and whose configuration could cause restraint to uniform cooling of the weldment, conform to detailed welding procedures prepared by the Contractor’s Engineer.

.10 Architecturally Exposed Structural Steel

.1 Fabricate and assemble AESS in the shop to the greatest extent possible.

.2 Locate field connections in AESS assemblies at concealed locations approved by the Contract Administrator.

.3 Perform fabrication with special care and necessary straightening to maintain the condition of the material as described in this section. AESS surface quality to be consistent with AESS Category specified in the Contract Documents and the visual samples prepared prior to fabrication.

.4 Show clearly the required fabrication tolerances on shop drawings. Show the required tolerances for setting embedded items on erection drawings.

.5 Make copes, mitres and butt cuts in surfaces exposed to view within specified tolerances. Plan erection sequence so that these tolerances can be maintained.

.6 All exposed edges of plates shall be universal mill or guided flame cut. Exposed cut edges of beam flanges shall be guided flame cut. Cut surfaces shall be equal in smoothness to a mill finish.

.7 Except as otherwise indicated on the Drawings, all shop and field assembly shall be done by welding.

.8 Form and weld all joints exposed to weather to exclude water by the use of "seal" welds.

.9 Exposed welds, shall be ground smooth and otherwise finished flush and even with adjacent surfaces. Grinding is not required for well-formed fillet welds.

.10 Grind bevel welds smooth, forming neat, well-made corners.

.11 Grind smooth any welds on structural steel members in the finished building that are within the reach of the public.

3.2 Erection

.1 General

.1 Bracing members and anchor rods shown in the Contract Documents are for the finished structure and may not be adequate to resist forces present during construction.

.2 Maintain erection bracing until completion of entire structure including floor and roof decks and slabs, masonry walls and/or other elements which are part of the lateral load resisting system.

.3 Carry out erection operations, including installation of any temporary guying and shoring required, ensuring that the existing structure or members already erected are not loaded in excess of their safe load carrying capacity.

.4 Erection bracing must be adequate to restrict lateral drift per storey to an appropriate amount to ensure the steel erection can be completed within the necessary tolerances.

.5 During construction, forces or reactions in the steel frame members and their connections might exceed those on which the design is based. Determine the magnitude of such forces and reactions and take such measures as are necessary to ensure that the safety and stability of the structure is maintained until the entire structure, including floor and roof slabs is complete.

.6 Nuts on bolts shall be prevented from working loose by use of lock washers, lock nuts, jam nuts, thread burring or other approved methods.

.7 Runoff tabs shall be removed where required by the governing technical standard, or where they interfere with clearances required by other disciplines or would be exposed to view in the completed building.

.8 Where steel bars or strap anchors are shown connected to structural steel members in the Contract Documents, weld these bars/anchors to the steel members in a manner to fully develop the strength of the bars/anchors.

.9 Note that erection of structural steel may be dependent on the Work and progress of related Sections. For example, portions of the roof structure may have to be erected after roof mechanical units are in place. Co-ordinate this Work with the appropriate Sections.

.10 Report to the Contract Administrator where members cannot be erected within the specified tolerances without modification or special procedures. Take corrective measures to the Contract Administrator’s approval.

.2 Pre-Steel Erection Conference

.1 At least 60 days prior to the commencement of steel erection, the Contractor shall hold a pre-erection conference to review the detailed requirements and staging for the steel erection.

.2 The Contractor shall require responsible representatives of every party who is concerned with the steel erection to attend the conference, including but not limited to the following:

.1 The Contractor

.2 Steel Erector

.3 Steel Erector's Surveyor

.4 Steel Deck Contractor

.5 All Inspection and Testing Agencies

.6 Contract Administrator

.7 City's Representative

.3 Minutes of the meeting shall be recorded and distributed to all parties concerned within 5 days of the meeting.

.4 The minutes shall include a detailed outline of the steel erection procedure including a schedule of milestone dates for erection staging surveying and sign-offs which will represent the agreements reached by all parties involved.

.3 Sequence of Construction

.1 During winter months the pouring of some slabs on deck may be delayed. The Contractor is to provide any additional guying or bracing to compensate for the temporary loss of diaphragm action and additional dead load, as deemed necessary.

.2 Equipment: Operate all machinery, apparatus and staging required for the erection of steelwork in a safe manner. Install, maintain and remove without damage to the other Work, scaffolding, erection bracing and other equipment, etc. as may be necessary or required.

.3 [Bracing: Securely brace the frame during erection to safely resist all dead loads, lateral loads and other erection stresses. Fully tighten all bolts as soon as possible as the Work progresses. Design erection bracing or guying to limit lateral floor-to-floor displacement to an appropriate amount to ensure steel erection can be completed within necessary tolerances.

.4 Errors: Immediately report to the Contract Administrator any errors in shop fabrication or deformations resulting from handling and transportation that prevent the proper assembly and fitting of parts. Make suggestions for corrective Work and obtain approval of the method of correction. Approved corrections shall be made expeditiously at no additional cost to the City.

.5 Column Base Plates: Column base plates shall be supported and aligned on steel shims or setting bolts. After the supported members have been plumbed and properly positioned, the anchor nuts shall be tightened, in preparation for grouting. Wedges and shims shall be cut off flush with the edges of plates and shall be left in place. All base plates greater than 600 mm in any dimension shall be set on steel angle seats or shim packs. Base plates larger than 900 mm shall be set on steel angle seats only.

.6 Leveling Plates: Leveling plates shall be set to the established lines and elevations. Provide steel shims as required for proper positioning of column/baseplate.

.4 Bolting and Welding of Structural Steel

.1 Splices: Fastening of splices of compression members shall be done after the abutting surfaces have been brought completely into contact. Splices will be permitted only where indicated on the Contract Drawings or the reviewed shop drawings.

.2 Driftpins: These may be used only to bring together the several parts, and shall not be used in such a manner as to distort or damage the steel. Poor matching of holes shall be corrected by drilling to the next larger size and the use of larger size bolts. Plug welding and redrilling will not be permitted, unless a specific instance arises and is approved by the Contract Administrator.

.3 Hammering: Hammering which may injure or distort the members will not be permitted.

.4 Additional Material: If the Contractor furnishes additional material for the purpose of erection or if the erection method requires that material be added to certain members, the required modifications and the additional metal parts shall be paid for by the Contractor.

.5 Bearing on Concrete or Masonry

.1 Set steel baseplates and bearing assemblies true and level at the proper elevation so that upon grouting, they will have full bearing. Unless noted otherwise by the grout supplier, do not vibrate the formwork or baseplate during grout placement. Grout shall be placed on one side only and pushed back under the baseplate with strapping.

.2 When directed by the Contract Administrator, lift at least 3 grouted bases so that the adequacy of grouting can be examined. If defects are found, more bases will have to the raised.

.6 Joists

.1 Anchor joists in accordance with CSA S16 and to safely resist net uplift forces.

.2 Supply special shoes or steel shims as required to bring joists to required bearing level.

.3 Provide suitable temporary anchorage until such time as the permanent anchorage system can maintain the joists in their correct position.

.4 Where joists are exposed or where the ceiling is attached directly to the bottom chord, keep under surface of joists to a true level plane by careful attention to the manufacture, packing under joist bearing and other means necessary.

.5 Where the Contract Documents call for electrical and mechanical services recessed between joists, space and arrange joists and bridging to permit installation of services.

.6 Provide ceiling extensions for joist bottom chords as required.

.7 Lintels

.1 Unless a reinforced block or concrete lintel is noted, provide loose steel lintels, to the details shown in the Contract Documents, over openings and recesses including those for mechanical or electrical services in masonry walls or partitions.

.8 Architecturally Exposed Structural Steel

.1 Set AESS accurately in locations and to elevations indicated in the Contract Documents, and according to CSA S16.

.2 In addition to the special care used to handle and erect AESS, employ the proper erection techniques to meet the requirements of the AESS Category specified in the Contract Documents:

.1 AESS Erection tolerances: Erection tolerances shall meet the requirements of standard frame tolerances for structural steel per CSA S16, unless noted otherwise in the Contract Documents.

.2 Bolt Head Placement: All bolt heads shall be placed as indicated in the Contract Documents. Where no specific direction is provided in the Contract Documents, all of the bolt heads in a given connection shall be placed to one side of the connection;

.3 Removal of field connection aids: Run-out tabs, erection bolts and other steel members added to connections to allow for alignment, fit-up and weldings in the field shall be removed from the structure. Welds at run-out tabs shall be removed to match adjacent surfaces and ground smooth. Holes for erection bolts shall be plug welded and ground smooth where specified in the Contract Documents;

.4 Filling of connection access holes: Filling shall be executed with proper procedures to match architectural profile, where specified in the Contract Documents;

.5 Field Welding: Weld profile, quality, and finish shall be consistent with Category and visual samples, if applicable, approved prior to fabrication.

3.3 Protection

.1 Cleaning Steel

.1 Clean structural steel and joists in accordance with the below:

.2 Clean surfaces within 50 mm of any field weld location of materials that would prevent proper welding or produce objectionable fumes while welding Work is being performed.

.2 Painting

.1 Except where steel is to be galvanized, shop paint structural steel and joists in accordance with the below:

.1 Enviroment: Inside Vapour Barrier

.1 Preparation: SSPC-SP 3 Power Tool Cleaning

.2 Primer/Paint: CISC/CPMA 1-73a or Leave unpainted.

.2 Enviroment:Inside Vapour Barrier (joists not exposed to view)

.1 Preparation: SSPC-SP 2 Hand Tool Cleaning

.2 Primer/Paint: CISC/CPMA 1-73a or SSPC-Paint 15.

.3 Enviroment: Inside Vapour Barrier (steel exposed to view or AESS)

.1 Preparation: SSPC-SP 6 Commercial Blast Cleaning

.2 Primer/Paint: CISC/CPMA 2-75.

.3 Note additional requirements for AESS elsewhere in the Specification.

.4 Enviroment: Inside Vapour Barrier (joists exposed to view)

.1 Preparation: SSPC-SP 7 Brush-Off Blast Cleaning

.2 Primer/Paint: CISC/CPMA 2-75.

.5 Enviroment: Outside Vapour Barrier – All remaining steel

.1 Primer/Paint: Galvanize

.2 Note additional requirements for galvanizing elsewhere in the Specification.

.2 Do not paint steel items inside the vapour barrier that are to be encased in concrete and surfaces that are to have concrete placed against them or that are to be covered in cementitous fireproofing.

.3 Where shear connectors are to be field welded through the low flute of the steel deck, the top surface of the top flange, which is to receive the shear studs, is to be unpainted and free of heavy rust, mill scale, sand, or other foreign materials which will interfere with the stud welding operation.

.4 Joists shall have one coat of protective paint of a type standard with the manufacturer.

.5 Upon completion of erection, clean with mechanical brush and apply primer to welds, bolts and at locations where original primer is damaged.

.6 Additional Requirements for Architecturally Exposed Structural Steel:

.1 Apply one additional shop coat of paint as specified to parts of shop coated steel surfaces that will be inaccessible after erection.

.2 After erection and immediately after grinding welds, etc. touch up and paint with one coat of the same paint as the shop coat, all damaged and abraded spots, including any unpainted areas. Completely remove anti-spatter coating, if used before field touch-up painting.

.3 Galvanizing

.4 In accordance with ASTM A123/A123M, fully galvanize cooling tower structural steel, structural steel lintels, masonry shelf angles, parking garage stairs and other steel materials exposed to weather including connection material and inserts.

.1 Where the galvanizing process may distort the members, submit procedures for review by the Contract Administrator and make good to tolerances noted in the Contract Documents.

.2 Galvanize members after shop welding has been completed.

.3 Do not weld to galvanized steel members. Where welding is necessary, remove galvanizing by grinding.

.4 Identify at time of tender any splices that are required due to the size, length or weight constraints imposed by the galvanizing process.

.5 High strength bolts grade A490M shall not be galvanized.

.5 Cold Weather Protection

.1 During cold weather, protect members from damage due to water freezing in confined areas.

.6 Corrosion

.1 Protect milled surfaces to prevent corrosion prior to erection.

3.4 Quality Control

.1 Visual Inspection

.1 As a minimum, carry out visual inspection of all shop and field welds in accordance with CSA W59.

.2 Non-Destructive Testing (NDT)

.1 Non-destructive testing shall be carried out by radiography, magnetic particle or ultra sonic methods, whichever is more appropriate.

.2 In addition to visual inspection, the Contractor is to include the following requirements for non-destructive testing:

.3 Any deficient welds identified by means of NDT, shall be repaired at the Contractor’s expense.

.4 Welds found deficient in dimensions, but not in quality may be enlarged by additional welding. Any weld found deficient in quality shall be removed by chipping or gouging and the weld shall be remade.

.5 Include for full NDT of all shop welded splices.

.6 Include for an additional 20% random NDT of remaining shop welded connections.

.3 General

.1 Bring to the attention of the Contract Administrator any defects in the Work or departures from the Contract Documents which may occur during construction. The Contract Administrator will decide upon corrective action and give recommendations in writing.

.2 The Contract Administrator's general review during construction and inspection and testing by Independent Inspection and Testing Companies reporting to the Contract Administrator are both undertaken to inform the City of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve the Contractor of contractual responsibility.

3.5 Notification

.1 Prior to commencing significant segments of the Work, give the Contract Administrator and Independent Inspection and Testing Companies appropriate notification so as to afford them reasonable opportunity to review Work previously completed. Failure to meet this requirement may be cause for the Contract Administrator to classify the Work as defective.

3.6 Inspection And Testing

.1 The City will appoint the Independent Inspection and Testing Companies to make inspections or perform tests as the Contract Administrator directs. The Independent Inspection and Testing Company shall be responsible only to the Contract Administrator, and shall make only such inspections or tests as the Contract Administrator may direct.

.2 When defects are revealed, the Contract Administrator may request, at the Contractor's expense, additional inspection or testing to ascertain the full extent of the defect.

.3 Inspection and testing may also include the non-destructive testing of the full butt welds, testing of headed studs on beams, and on connections to be cast into concrete.

3.7 Defective Materials And Work

.1 Where evidence exists that defective Work has occurred or that Work has been carried out incorporating defective materials, the Contract Administrator may have tests, inspections or surveys performed, analytical calculations of structural strength made and the like in order to help determine whether the Work must be replaced. Tests, inspections or surveys or calculations carried out under these circumstances will be made at the Contractor's expense, regardless of their results, which may be such that, in the Contract Administrator's opinion, the Work may be acceptable.

.2 All testing shall be conducted in accordance with the requirements of the Building Code, except where this would, in the Contract Administrator's opinion, cause undue delay or give results not representative of the rejected material in place. In this case, the tests shall be conducted in accordance with the standards given by the Contract Administrator.

.3 Materials or Work which fail to meet specified requirements may be rejected by the Contract Administrator whenever found at any time prior to the Total Performance of the Work regardless of previous inspection. If rejected, defective materials or Work shall be promptly removed and replaced or repaired to the satisfaction of the Contract Administrator, at no expense to the City.

END OF SECTION

PART 1 - GENERAL

1.1 Definitions

.1 The following Definitions shall apply in this Specification:

.2 Contract Documents

.1 The Contract Documents consist of the Drawings, Specifications and Reports which form part of the agreed Contract.

.3 Contract Administrator

.1 The Contract Administrator is the Architect, SEOR, persons or entities engaged by the City. The term Contract Administrator means the Contract Administrator or the Contract Administrator's authorized representative.

.4 Contractor

.1 The term Contractor is defined to include any of the following: Construction Manager, General Contractor, Structural Steel Erector, Structural Steel Fabricator, Subcontractor or Supplier.

.5 City

.1 The City is the person or entity identified as such in the Contract. The term City means the City or the City's authorized agent or representative but does not include the Contract Administrator.

.6 SEOR

.1 The SEOR is defined as the Structural Engineer of Record for the Contract.

1.2 Work Included

.1 Comply with Division 1, General Requirements and all documents referenced therein.

.2 Provide all labour, materials, plant and equipment to complete the steel deck work including, but not limited to, the following:

.1 Steel deck and accessories, including all gauge metal closures;

.2 Framing for openings up to and including 450 mm in roof deck and 300 mm in floor deck; and

.3 Shear stud connectors.

1.3 Section Includes

.1 This Section includes: steel deck, acoustic steel deck, concrete on steel deck, and qualification requirements.

1.4 Related Work Specified Elsewhere

.1 Section 03 20 00 - Concrete Reinforcement: Concrete reinforcement.

.2 Section 03 30 00 - Cast-in-Place Concrete: Cast-in-Place Concrete.

.3 Section 05 12 00 - Structural Steel: Support framing for openings larger than 450 mm in roof deck, 300 mm in floor deck and deck edge supports where loss of bearing for the steel deck occurs.

1.5 Reference Standards, Codes, And Acts

.1 Conform to the requirements of the local building code identified on the Structural General Notes as amended by all subsequent Regulations issued to the date of this Specification and applicable acts of authorities having jurisdiction.

.2 All references to the Standards and publications noted below shall be to the edition referenced in the local building code identified on the Structural General Notes, or to the edition referenced in the latest published editions or revisions of all Standards published by the Canadian Standards Association issued to the date of this Specification, whichever is the later edition or revision.

.3 All references noted below, which are not referenced by the local building code or the Standards published by the Canadian Standards Association, shall be to the latest edition and revision published to the date of this Specification.

.4 Standards and publications referenced by the standards noted below shall apply even if they are not included in the list. Where such references are made, they shall be to the latest edition and revision published to the date of this Specification.

.5 Where there are differences between the Specifications and Drawings and the codes, standards, or acts, the most stringent shall govern.

.6 ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.

.7 ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.8 AWS D1.1/D1.1M - Structural Welding Code - Steel.

.9 CSA W47.1 - Certification of Companies for Fusion Welding of Steel.

.10 CSA W59 - Welded Steel Construction.

.11 CSSBI 10M - Standard for Steel Roof Deck.

.12 CSSBI 12M - Standard for Composite Steel Deck.

.13 CSSBI B13 - Design of Steel Deck Diaphragms.

1.6 Qualifications

.1 Organizations and welders undertaking to weld under this Contract shall be certified by the Canadian Welding Bureau under the requirements of CSA W47.1 as applicable.

.2 The Contractor shall ensure that the manufacturer and the steel deck erector shall each demonstrate a minimum of 10 years of relevant experience with the steel deck systems specified in the Contract Documents.

.3 Design calculations shall be carried out by or under the direct supervision of a qualified Professional Engineer licensed by the authority having jurisdiction, with a minimum of 5 years Canadian experience in the design of steel deck.

1.7 Design

.1 Design steel deck in accordance with the requirements of the Building Code.

.2 The minimum steel core thickness shall be 0.76 mm except that for steel deck which is considered architecturally exposed to view the minimum steel core thickness shall be 0.91 mm.

.3 Design floor deck such that the live load deflection of deck shall not exceed l/360 of the span.

.4 Design roof deck such that the live load deflection of deck shall not exceed l/300 except when deck supports non-structural services or finishes that are identified as being susceptible to damage. In this case, design roof deck such that deflection of deck shall not exceed l/360 of the span.

.5 Design roof deck such that deflection does not exceed l/300 of the span when supporting a 1.3 kN point load acting over a 300 mm strip of deck.

.6 Design deck anchorage to the supporting structure to safely resist the net uplift forces indicated in the Contract Documents. Design anchorages for deck supporting concrete slabs for net uplift during construction.

.7 Wherever structural framing permits, steel deck shall be designed and fabricated to span continuously over at least four supports (three spans).

.8 Determine structural properties of the concrete slab and composite construction in accordance with requirements of The Building Code.

.9 Design and install composite deck and metal edge and closure strips to safely support construction and other loads before the composite action of the deck system takes place, without excessive deflection. Design and detail temporary intermediate supports for the composite deck where required. Identify areas where this is required and submit shop drawings showing the proposed temporary support detail.

.10 Design framing for openings through the deck up to a maximum width of 300 mm in floor deck and 450 mm in roof deck measured perpendicular to the span of the deck.

.11 Detail metal edge and closure strips to prevent the loss of grout when the deck is concreted.

.12 Headed studs have been designed to ensure composite action between the steel framing members and the slab on deck floor system. The design of these studs has been based on an assumed steel deck profile where the average flute width is at least twice the height of the deck.

1.8 Submittals

.1 Shop Drawings

.1 Submit shop and erection drawings and load tables for review by the Contract Administrator.

.2 Unless noted otherwise in the Contract Documents on all shop drawings provide adequate space immediately above the drawing's title block for a Contract Administrator's Shop Drawing review stamp. Where requested by the Contract Administrator, the stamp is to be inserted by this section directly into the shop drawing prior to submission. The stamp shall be positioned in the same location on each shop drawing, and in no case shall the allocated space be less than 63 mm x 75 mm. Request the details of these requirements from the Contract Administrator no less than 2 weeks before the commencement of shop drawings.

.3 Each drawing submitted shall bear the signature and stamp of a qualified Professional Engineer licensed by the authority having jurisdiction.

.4 Reproduction of the structural Drawings to serve as shop drawings will be permitted and is subject to a separate agreement between the Structural Engineer and the Contractor. Any costs associated with the preparation of the structural Drawings for use by the Contractor shall be paid for by this section.

.5 As a minimum, the shop drawings shall show the following:

.1 Types of deck and their locations, including the setting out points for the deck;

.2 Sufficient detail sections showing the deck's orientation to support members to facilitate erection of deck;

.3 Design loads, including diaphragm forces;

.4 Connections to supports including welding details and details for pins and screws if appropriate;

.5 Net uplift pressures, including pressures during construction;

.6 Openings and their reinforcement, coordinated with the mechanical and electrical contractor's sleeving drawings;

.7 Base steel thickness;

.8 Surface protective coating;

.9 Metal edge and closure strips;

.10 Acoustic details, if applicable;

.11 Locations of shoring (if required) and the shoring loads imposed on the structures below;

.12 Locations, size, type, and welding requirements of welded stud shear connectors;

.13 Diaphragm shear stiffness factor, as required; and

.14 Areas where insufficient bearing on supporting steel members will be provided due to steel connections, vertical bracing connections or the like. Coordinate with Section 05 12 00 - Structural Steel for additional bearing details required in these locations.

.6 Provide the inspection company with a copy of each reviewed drawing bearing the Contract Administrator's shop drawing review stamp.

.2 Calculations

.1 Submit calculations bearing the seal and signature of the qualified Professional Engineer licensed by the authority having jurisdiction and such further proof as may be necessary to show that the steel deck and all related accessories conform to the requirements set forth in this Section.

.3 As-Built Drawings

.1 Mark on a complete set of final drawings any changes, additions, or deletions that occurred during construction.

.2 For all shop drawings marked "Reviewed as Noted" or "Revise and Resubmit", update and submit a record set of these drawings at the completion of the structural Work. Ensure that these drawings reflect the changes and are coordinated with the final drawings noted above.

.4 Mill Test Reports

.1 Submit all mill test reports covering chemical and physical properties of materials used in this Work a minimum of 4 weeks prior to commencing fabrication.

.5 Surveys

.1 Submit surveys showing position of structural elements in their as-built condition. Coordinate the location of survey points described below with those noted in 05 12 00 - Structural Steel.

.2 At a minimum, submit the following:

.1 Elevation of deck at all columns, centre of bays, midway between columns along gridlines and at cantilever ends, on all floors, as follows:

.2 Location of slab edges at all perimeter columns and midway between columns along the perimeter; and

.3 Dates of all surveys.

PART 2 - PRODUCTS

2.1 Steel Deck

.1 Sheet Steel: ASTM A653/A653M, Structural Quality; with Z180 or A25 minimum coating for steel deck not considered architecturally exposed to view or weather. Deck which is considered architecturally exposed to view or weather or deck in high humidity areas shall have Z275 minimum coating.

.2 The composite steel deck and concrete slab shall comply with the fire-rating requirements.

.3 Provide steel deck profile with interlocking side joints.

.4 Related Deck Accessories: Metal closure strips, cover plates and cant strips.

.5 Related Deck Accessories: Wet concrete stops.

.6 Stud Shear Connectors: ASTM A108 (Grade 1015). Headed studs shall be welded per manufacturer recommendations.

.7 Mechanical Fasteners: Fasteners shall have knurled shank; minimum 12 mm diameter steel washers; electroplated zinc coating conforming to ASTM B633, Sc. 1, Type III; meeting CSSBI design requirements, such as Hilti X-EDNK22 THQ12, X-EDN19 THQ12, or X-ENP-19 L15 fasteners. For use on open web steel joists with top flange thicknesses between 3 mm to 6 mm, use Hilti X-EDNK22 THQ12 fasteners. For open web steel joists or beams with a top flange thickness of 5 mm to 10 mm use Hilti X-EDN19 THQ12 fasteners. For flanges equal to or greater than 6 mm, use Hilti X-ENP-19 L15 fasteners. Verify performance and applicability of application with the manufacturer by performing test fastenings prior to the installation of the deck.

.8 Side Lap Connectors: Sidelap connectors to connect steel deck units at overlaps can consist of Hilti SLC 01 for gauges 18 to 26 or the Hilti SLC 02 for gauges 16 to 22.

.9 Welding Materials: Type required for materials being welded.

.10 Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 type I - Inorganic or SSPC-Paint 20 type II - Organic

2.2 Acoustic Steel Deck

.1 Provide acoustic steel deck where noted in the Contract Documents.

.2 Form acoustical steel deck with staggered perforations on all vertical ribs, to meet the specified noise criteria.

2.3 Acoustic Insulation

.1 Fibrous glass, density of 17.5 kg/cub.m profiled to deck flutes.

2.4 Acoustic Closures

.1 Closed cell foam rubber 25 mm thick, profiled to fit tight to the deck.

PART 3 - EXECUTION

3.1 Installation

.1 General

.1 Install steel deck to manufacturer's written instructions and to CSSBI requirements, (including but not limited to CSSBI 10M and CSSBI B13).

.2 Install composite steel deck to manufacturer's written instructions and to CSSBI requirements, (including but not limited to CSSBI 12M and CSSBI B13).

.3 Install steel deck such that it is free of dirt, scale, foreign matter, dents, or deformations. Deck, which is considered architecturally exposed to view, that is dented or deformed is subject to acceptance by the Contract Administrator.

.4 Lap ends of deck units not receiving concrete slab a minimum of 50 mmand only over supporting members.

.5 Where steel deck spans parallel to beams that are to have studs added to top flange, arrange bottom flutes to be centred over beams. If this is not possible, interrupt decking so that studs can be placed on beams to allow composite action to take place.

.6 Bear deck on masonry and concrete support surfaces with 100 mm minimum bearing. Align and level the deck.

.7 Bear deck on steel supports with 75 mm bearing. Align and level the deck.

.8 Fasten steel deck to supporting members to safely resist the forces indicated in the Contract Documents but with not less than 19 mm diameter fusion welds at 300 mm on center at intermediate supports and 19 mm diameter fusion welds at 150 mm on center at end supports parallel with the deck flute and at each transverse flute.

.9 Weld to CSA W59.

.10 Mechanically clinch or fasten male/female side laps to resist the forces indicated in the Contract Documents but at not more than 600 mm on centre maximum, or Weld male/female side laps to resist the forces indicated in the Contract Documents but at not more than 450 mm on centre maximum.

.11 Make fusion welds of deck to supporting members well within bearing width of supporting members.

.12 Provide gauge metal closures along edges of all deck parallel to span where deck is not otherwise continuously supported, at all changes in direction of the span of the deck, at all discontinuities of sloped deck, and at all openings through concrete slabs on steel deck.

.13 Level and align cellular deck within 3 mm horizontally and vertically. Butt ends, allow for maximum 3 mm gap. Install sheet steel covers over gaps wider than 3 mm. Tape and seal joints watertight.

.2 Openings Through Deck

.1 Obtain opening and sleeving information from Subcontractors responsible for the related Work of other Sections before proceeding with the work. Coordinate with the Work of other Sections as necessary.

.2 Indicate openings and reinforcement for openings on fabrication and erection drawings.

.3 Cut openings and reinforce edges as required for pipes, ducts, and the like. The maximum size of an unreinforced opening is 150 mm square or in diameter. Reinforce openings having a dimension over150 mm but not exceeding 300 mm in floor deck or 450 mm in roof deck. The location of holes through decking shall be to the approval of the Contract Administrator.

.4 Where possible, leave deck intact and use block outs to form concrete edges at openings. Cut deck after concrete has reached a minimum of 70% of its 28 day specified strength.

.3 Supports from Deck

.1 No hangers or brackets supporting mechanical and electrical services, artwork, ceilings, bulkheads, lighting and the like from the roof deck are permitted, unless the deck is designed specifically for the imposed loads.

.4 Welded Stud Shear Connectors

.1 Weld headed studs to the supporting structural steel through the steel deck as per the requirements of CSA W59, except where studs are required to be welded to the steel in the shop.

.2 Where stud shear connectors are shop welded to supporting steel members, accurately layout and predrill holes in the deck to facilitate installation of the deck in the field. The use of torch cutting of holes is not permitted.

.5 Protection

.1 Immediately after any deck which does not receive a concrete slab is permanently secured in place, touch up top surface of deck with primer, where the shop applied coating is damaged during installation or by welding of the deck in place.

.6 Closures

.1 Seal off spaces between flutes with closures of neoprene or closed-cell expanded PVC at partitions, walls, and other locations indicated in the Contract Documents. At exterior walls, provide insulated closures.

.2 Where steel deck rests on exterior masonry walls, fill web spaces with closures as recommended by manufacturer.

.3 Where flutes are at, or close to, a perpendicular angle to exterior walls (or other supports at the building perimeter), and the steel deck, exposed on underside, extends beyond these walls/supports and/or beyond the vapour barrier, install interior and exterior closures. In addition, provide the roofer with sufficient quantity of glass fibre pads to close off the topside flutes directly over face of wall or use closures as recommended by manufacturer.

.4 Where flutes run at, or close to, a perpendicular angle to interior partitions, fill web spaces with double run of steel closures or as recommended by manufacturer.

.5 Where flutes are parallel, or close to parallel, to interior partitions, install steel closure flashings to provide neat juncture between two materials or as recommended by manufacturer.

.6 Closures are not required between interior partitions and underside of deck in areas having suspended ceiling, unless specified by the Contract Administrator.

.7 Attach metal cell closures at locations required to contain poured concrete.

3.2 Quality Control

.1 Implement a system of quality control to ensure that the minimum standards specified in this Section are attained.

.2 Bring to the attention of the Contract Administrator any defects in the Work or departures from the Contract Documents which may occur during construction. The Contract Administrator will decide upon corrective action and give recommendations in writing.

.3 The Contract Administrator's general review during construction and inspection and testing by independent inspection and testing agencies reporting to the Contract Administrator are both undertaken to inform the City of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve the Contractor of its contractual responsibility.

3.3 Notification

.1 Prior to commencing significant segments of the Work, give the Contract Administrator and Independent Inspection and Testing Companies appropriate notification so as to afford them reasonable opportunity to review the Work. Failure to meet this requirement may be cause for the Contract Administrator to classify the Work as defective.

3.4 Inspection And Testing

.1 The City will appoint the Independent Inspection and Testing Company to make inspections or perform tests as the Contract Administrator directs. The Independent Inspection and Testing Company shall be responsible only to the Contract Administrator, and shall make only such inspection or tests as the Contract Administrator may direct.

.2 Inspection and testing will include the testing of stud shear connectors.

3.5 Defective Materials And Work

.1 Where evidence exists that defective Work has occurred or that Work has been carried out incorporating defective materials, the Contract Administrator may have tests, inspections, or surveys performed such as concrete core strength tests, analytical calculations of structural strength, and the like, in order to help determine whether the Work must be replaced. Tests, inspections or surveys or calculations carried out under these circumstances will be made at the Contractor's expense, regardless of their results, which may be such that, in the Contract Administrator's opinion, the Work may be acceptable.

.2 All testing shall be conducted in accordance with the requirements of the Building Code, except where this would in the Contract Administrator's opinion cause undue delay or give results not representative of the rejected Products in place. In this case, the tests shall be conducted in accordance with the standards given by the Contract Administrator.

.3 Products or Work which fails to meet the specified requirements may be rejected by the Contract Administrator whenever found at any time prior to the Total Performance of the work regardless of previous inspection. If rejected, defective materials or Work shall be removed and replaced or repaired to the satisfaction of the Contract Administrator, promptly, at no expense to the City.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Lateral load-bearing cold-formed metal framing, including but not limited to metal studs, furring, at exterior assemblies subject to lateral loads and loads transferred by exterior materials and assemblies.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Submit engineered shop drawings. Field review requirements shall include the following:

.1 Checking that mill test reports are properly correlated to materials.

.2 Sampling fabrication and erection procedures for general conformity to requirements of the Contract Documents.

.3 Checking fabricated members against specified member shapes.

.4 Sample checking of screwed and bolted joints.

.5 Sample checking that tolerances are not exceeded during fit-up or erection.

.6 General review of field cutting and alterations required by other sections.

.2 Include necessary shop details and erection diagrams. Indicate member sizes, locations thicknesses exclusive of coating, coatings and materials. Include connection details for attaching framing to itself and for attachment to the structure. Show splice details where permitted. Indicate dimensions, openings, requirements of related work and critical installation procedures. Show temporary bracing required for erection purposes.

.3 Indicate design loads and design calculations, including horizontal and vertical reactions at connections to building structure for all load cases.

.4 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Subcontractor:

.1 Has adequate equipment and skilled workers to perform the work expeditiously.

.2 Has successfully completed installations similar to that specified during a period of at least the immediate past 5 years.

.2 Mock-up:

.1 Prepare a mock-up of work. Incorporate materials and methods of fabrication and installation identical with project requirements. Install mock-up at location directed by Contract Administrator, separate to the work. Retain accepted mock-up as quality standard for acceptance of completed work. Provide mock-up of sufficient size and scope to show construction and workmanship for work.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Base design on limit states design principles using factored loads and resistances.

.2 Specified lateral loads shall be in accordance with the building code. For wind load calculations, the reference velocity pressure, q, shall be based on a 1 in 50 probability of being exceeded in any one year.

.3 Resistances and resistance factors shall be in accordance with the building code and CAN/CSA S136-16.

.4 Conform to the requirements of fire rated assemblies which have been tested in accordance with CAN/ULC S101-14 and provide indicated fire resistance rating.

.5 Design and provide work of this section in accordance with Exterior Insulation and Finish Systems Best Practice Guide Building Technology, latest edition.

.6 Design bridging to prevent member rotation and member translation perpendicular to the minor axis. Provide for secondary stress effects due to torsion between lines of bridging. Do not rely on collateral sheathing to help restrain member rotation and translation perpendicular to the minor axis. Provide bridging at 1525 mm (60") on centre maximum. Space bridging at equal intervals over the span length of the member.

.7 Design anchorage and splice details for bridging.

.8 Design for local loading due to anchorage of cladding and interior wall mounted fixtures.

.9 Maximum flexural deflections under specified lateral loads shall conform to following:

.1 L/360 unless otherwise indicated.

.2 Metal framing supporting masonry veneer shall meet the requirements of CSA S304-14.

.10 Design components or assemblies to accommodate specified erection tolerances of the structure.

.11 Provide head, sill and jamb members and connections to frame openings larger than 100 mm (3-15/16") in any dimension.

.12 Limit free play and movement in connections perpendicular to the plane of the framing to ± 0.5 mm (0.019") relative to the building structure.

.13 Anchor top and bottom track to the structure at a maximum spacing of 813 mm (32") centre to centre. Closer spacing shall be required in accordance with design requirements.

.14 Allow for movement of structure. Design end connections to accommodate floor/roof deflections such that framing is not loaded axially.

.15 Connections between lightweight steel framing members shall be by bolts or sheet metal screws.

.16 Resistances for sheet metal screws shall be based on manufacturer's lowest bound test values multiplied by appropriate resistance factor, given in CAN/CSA S136-16.

.17 Exterior soffit framing systems shall be inclusive of horizontal framing, secondary framing members, lateral braces, suspension members, and any other elements subject to lateral loads and dead loads of soffit cladding systems.

.18 Lateral load bearing metal framing include:

.1 Framing subjected to lateral loads.

.2 Steel bridging.

.3 Top and bottom track.

.4 Head and sill members and jamb framing for openings.

.5 Bridging and track connections.

.6 Top and bottom track connections to main structure including detailing to accommodate floor deflections.

2.3 Materials

.1 Steel to conform to requirements of CAN/CSA S136-16 and be identified as to specification, type grade and mechanical properties.

.1 Minimum base steel thickness exclusive of coating shall be as follows:

.1 1.087 mm (0.0428”). Use greater stud thickness if required by the design criteria.

.2 Minimum thickness for clip angles shall be 1.367 mm (0.054”). Use greater clip angle thickness if required by the design criteria.

.2 Metal framing members forming part of exterior building envelope shall have a minimum coating of Z275 galvanizing in accordance with ASTM A924/A924M-22a. Other coatings providing equal or better corrosion protection may be used, subject to acceptance of Contract Administrator.

.3 Sheet metal screws shall have a minimum coating thickness of 0.008 mm (0.0003”) of zinc. Other coatings providing equal or better corrosion protection may be used, subject to acceptance of Contract Administrator.

.4 Zinc rich paint for touching up damaged metallic coatings shall conform to CAN/CGSB 1.181-M99.

.5 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.6 Concrete anchors shall have a minimum coating thickness of 0.008 mm (0.00032”) of zinc. Other coatings providing equal or better corrosion protection may be used.

.7 Screws:

.1 Steel screws shall be equal to or exceed minimum diameter indicated on shop drawings.

.2 Penetration beyond joined materials shall be not less than 3 exposed threads.

.3 Thread types and drilling capability shall conform to manufacturer's recommendations.

.4 Screws covered by sheathing materials shall have low profile heads.

2.4 Fabrication

.1 Provide cut-outs centred in webs of members to accommodate mechanical and electrical services. Effect of cut-outs on strength and stiffness of members shall be considered.

.2 Steel thickness exclusive of coating shall be marked on each member by embossing, stamping with indelible ink or by colour coding.

PART 3 - EXECUTION

3.1 Erection

.1 Erect lateral load-bearing metal framing true and plumb within specified tolerances.

.2 Employ temporary bracing wherever necessary to withstand loads to which the structure may be subject during erection and subsequent construction.

.1 Leave temporary bracing in place as long as required for safety and integrity of structure.

.2 Erector shall verify that during erection a margin of safety consistent with the requirements of the building code and CAN/CSA S136-16.

.3 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.4 Erection tolerances:

.1 For purposes of this section, camber is defined as deviation from straightness of a member or any portion of a member or any portion of a member with respect to its major axis.

.2 For framing, out of plumbness shall not exceed 1/500th of member length. Out of straightness (camber and sweep) shall not exceed 1/1000th of the member length.

.3 Metal framing shall seat into top and bottom tracks. Gap between end of stud and web of track shall not exceed 4 mm (0.158").

.4 For track, camber shall not exceed 1/1000th of member length.

.5 Spacing of metal framing shall not be more than 3 mm (1/8") from design spacing. Cumulative error in spacing shall not exceed requirements of finishing materials.

.5 Make field measurements necessary to ensure proper fit of members.

.6 Cutting of members may be by saw or shear. Torch cutting is not permitted.

.7 Holes that are field cut into lightweight steel framing members shall conform to requirements specified under “Fabrication” heading in Section 05 41 13 and requirements specified under “Erection” heading in Section 05 41 13.

3.2 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Work of this section includes metal fabrications as set-out in the Miscellaneous Metals Schedule or as indicated on the Drawings.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Submit list of fabrications to be provided as part of the work of this section.

.3 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.4 Shop drawings:

.1 Submit engineered shop drawings.

.2 Include plans, sections and large scale details, and indicate components and methods of assembly, materials and their characteristics, fastenings, metal finishes, welds, and their structural characteristics relative to their purpose, and other fabrication information required.

.3 Indicate proposed Site connections and methods.

.4 Submit coordination drawings indicating locations of concealed grounds, cutouts, plates, and other required fabrications.

.5 Show relation to adjoining construction, details of outside and inside corners and door openings.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Subcontractor:

.1 Has adequate plant, equipment, and skilled workers to perform work expeditiously.

.2 Has successfully completed installations similar to that required in the Work during a period of at least the immediate past 5 years.

.2 Requirements of regulatory agencies: the work of this section that functions to resist forces imposed by dead and live loads shall conform to requirements of jurisdictional authorities.

.3 Mock-ups:

.1 Construct mock-ups of the following, complete in all respects:

.1 Flat bar painted metal handrail support.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Design, fabricate, and install work of this section in accordance with the building code and requirements of authorities having jurisdiction.

.1 Where hard floor finishes are indicated or scheduled as the floor finish on treads and landings, design treads and landings to limit live load deflection to span/720 and total deflection to span/360.

.2 Welding:

.1 Steel: Weld components to conform to requirements of CSA W59-24, and by a fabricator fully certified by the Canadian Welding Bureau to conditions of CSA W47.1-19 and CSA W55.3-08(R2023) as applicable.

.2 Stainless steel: Weld components to conform to requirements of CSA W59-24 and ANSI/AWS D1.6/D1.6M-2017 as applicable, and by a fabricator fully certified by the Canadian Welding Bureau to conditions of CSA W47.1-19.

.3 Design stair stringers to limit vibration as specified in CSA-S16-19, Appendix E, Guide for Floor Vibrations.

.4 Design assemblies and connections to withstand own dead load, live loads, super-imposed dead loads, and fabrication forces, without permanent distortions or deformation, to maximum allowable deflection of L/360, within the following construction tolerances:

.1 Maximum variation from plumb in vertical lines: 3.2 mm (1/8") in 3 m (10'-0").

.2 Maximum variation from level: 3.2 mm (1/8") in 9 m (30'-0").

.3 Maximum variation from straight: 3.2 mm (1/8") in 3 m (10'-0") under a 3 m (10'-0") straight edge.

.4 Maximum variation from angle indicated: 10 seconds.

.5 Tolerances shall be non-cumulative.

2.3 Materials

.1 General:

.1 Unless detailed or specified otherwise, standard Materials will be acceptable if construction details and installation meet requirements of the Contract Documents.

.2 Include materials, Materials, accessories, and supplementary parts necessary to complete assembly and installation of work of Section 05 50 00.

.3 Incorporate only metals that are free from defects that are visible, or that impair strength or durability. Install only new metals that are of best quality, free from rust or waves and buckles, clean, straight, with sharply defined profiles.

.2 Steel:

.1 Structural shapes, plate, bars: hot-rolled or cold-rolled to suit design requirements, in accordance with CSA G40.21-13, Grade 300W.

.2 Hollow structural sections: hot-formed or cold-formed to suit design requirements, seamless, in accordance with CSA G40.21-13, Grade 350W, Class H or Class C.

.3 Mild sheet and strip: hot rolled, in accordance with ASTM A1011/A1011M-18a.

.4 Cold rolled sheet: stretcher levelled, fully pickled, in accordance with ASTM A1008/A1008M-18, Grade CS Type A exposed, matte finish, dry, unless otherwise indicated.

.5 Steel pipe: in accordance with ASTM A53/A53M-20, Type E or S, Grade A or B, standard weight, Schedule 40 seamless black or AISI MT 1010/1015.

.3 Stainless steel:

.1 Type 304 unless otherwise indicated.

.2 Stainless steel tubing: in accordance with ASTM A269/A269M-22, Commercial Grade, seamless welded.

.3 Stainless steel sheet and plate: in accordance with ASTM A167-99(2009).

.4 Stainless steel bar and angle: in accordance with ASTM A276/A276M-23.

.5 Stainless steel seamless pipe: in accordance with ASTM A312/A312M-21.

2.4 Accessories

.1 Fasteners:

.1 Exposed fasteners to match the appearance of the surface on which they occur.

.2 For fastening steel: Zinc plated screws and bolts, and in accordance with ASTM A307-21, Type 304 stainless steel where exposed to exterior.

.3 For fastening stainless steel: Stainless steel 300 Series or stainless steel 400 Series.

.4 High strength bolts: in accordance with ASTM A325-14.

.5 Concrete anchors; exterior exposed to weather: embedded epoxy set anchors, unless otherwise indicated.

.1 Size: in accordance with manufacturer's written requirements and reviewed shop drawings. Embedment depth shall not be greater than 80% of concrete thickness.

.6 Other types of fasteners as appropriate to meet design requirements.

.7 Fasteners shall be tamperproof where exposed.

.2 Welding materials:

.1 Steel: in accordance with CSA W59-24.

.2 Stainless steel: in accordance with ANSI/AWS D1.6/D1.6M-2017.

.3 Grout:

.1 Epoxy grout; non-shrink, non-expanding.

.1 Acceptable Materials:

.1 Hilti 'HY-200'.

.2 Sika 'Sika AnchorFix 3001'.

.3 W.R. Meadows 'REZI-WELD 3/2 EPOXY GROUT/PATCH'.

.4 Substitutions: in accordance with Section 01 25 00.

.2 Cementitious grout: non-shrink, non-expanding in accordance with ASTM C1107/C1107M-20:

.1 Acceptable Materials:

.1 Sika 'Sika Grout 212' or 'Sika M-Bed Standard'.

.2 W.R. Meadows 'Sealtight CG-86 Construction Grout'.

.3 Substitutions: in accordance with Section 01 25 00.

.4 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

2.5 Finishes

.1 Shop primer; steel:

.1 In accordance with CISC/CPMA 2-75 or SSPC-Paint 20, Paint Specification No. 20: Zinc-Rich Primers (Type I "Inorganic" and Type II "Organic").

.2 Hot dip galvanizing: in accordance with ASTM A123/A123M-17, minimum zinc coating of 600 g/m². Use air cooling method (no water or chromate dipping treatment permitted).

.3 Zinc rich paint; steel: Two-component zinc-rich coating, zinc powder in accordance with ASTM D520-00(2019) Type III ,SSPC-Paint 20, Type 1 Inorganic or single-component zinc-rich coating to SSPC-Paint, Type 2 Organic, CAN/CGSB 1.181-M99, VOC content <100 g/l to ASTM D1475-13(2020).

.1 Acceptable Materials:

.1 Aervoe Industries, Inc. 'Low VOC Cold Galvanize Coating 93% Zinc'.

.2 ZRC Worldwide 'ZRC Zero-VOC Galvanizing Compound'.

.3 Substitutions: in accordance with Section 01 25 00.

.4 Stainless steel: in accordance with AISI No. 4 brushed finish.

2.6 Fabrication

.1 General:

.1 Fabricate metal fabrications with machinery and tools specifically designed for the intended manufacturing processes and by skilled tradesmen.

.2 Fit and assemble metal fabrications in shop. When this is not possible, make a trial shop assembly.

.3 Incorporate means for fastenings of other work secured to work of this section.

.2 Construction:

.1 Fabricate with materials, component sizes, metal gauges, reinforcing, anchors, and fasteners of adequate strength to withstand intended use, and within allowable design factors imposed by jurisdictional authorities. Fabricate items from steel unless otherwise noted.

.2 Metal fabrications shall remain free of warping, buckling, opening of joints and seams, distortion, and permanent deformation.

.3 Stairs:

.1 NAAMM Stair Standard: Comply with NAAMM-AMP 510-92, "Metal Stairs Manual," for Industrial Class, unless more stringent requirements are indicated.

.2 Metal pan stairs:

.1 Fabricate risers, subtread pans, and subplatforms in accordance with reviewed shop drawings.

.2 Weld metal pans to stringers. Welds shall be on top of subtreads and concealed by concrete fill. Risers shall not be welded to stringers.

.4 Construct items that are part of floor construction, such as gratings and trench covers, to support the same live loads for which surrounding construction is designed.

.5 Non-galvanized steel fabrications at exterior locations: Provide drainage holes at exterior exposed tubular fabrications to permit drainage of moisture to exterior of metal fabrications.

.3 Assembly:

.1 Accurately cut, machine and fit joints, corners, copes and mitres so that junctions between components fit together tightly and in true planes.

.2 Provide smooth welds with splatter removed where exposed to view.

.1 Finish welds shall comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #4 - Good quality, uniform undressed weld with minimal splatter as shown in NAAMM-AMP 521-01(R2012).

.3 Allow for differential movements within assemblies and at junctions of assemblies with surrounding Work.

.4 Field welding of hot dipped galvanized members permitted only when other fastening methods are not possible. Locations of field welds to be clearly identified on reviewed shop drawings.

.5 Incorporate holes and connections for work installed under other sections.

.6 Cleanly and smoothly finish exposed edges of materials including holes.

.7 Cap open ends of sections exposed to view, such as pipes, channels, angles, and other similar work.

.4 Shop prime painting:

.1 Clean loose mill scale, rust, dirt, weld flux and spatter from the work after fabrication.

.2 Prepare and prime paint in accordance with manufacturer’s installation requirements. Prepare steel by methods specified in CISC/CPMA 2-75 or SSPC-SP3-18.

.5 Galvanizing:

.1 Galvanize metal fabrications following fabrication.

.2 Paint damage galvanized surfaces with zinc rich paint, immediately following damage to galvanized protection. Prepare substrate to remove oil and grease to SSPC-SP1-16, rust scale to SSPC-SP3-18, mill scale to SSPC-SP6/NACE No. 3-07.

.3 At interior locations, fill vent and drain holes exposed in the finished Work by plugging with zinc solder and filing off smooth.

.4 At exterior locations, except where indicated to remain as weep holes, fill vent and drain holes exposed in the finished Work by plugging with zinc solder and filing off smooth.

PART 3 - EXECUTION

3.1 Examination

.1 Take measurements at the Site to verify that metal fabrications fit surrounding construction, around obstructions and projections in place, or as indicated, and to suit service locations.

3.2 Installation

.1 Install metal fabrications plumb, true, square, straight, level, and accurately and tightly fitted together and to surrounding work.

.2 Include in work of this section anchor bolts, high tensile bolts, washers and nuts, expansion bolts, toggles, straps, sleeves, brackets, clips, and other items necessary for secure installation as required by loading and jurisdictional authorities.

.3 Countersink holes at wood screw locations where wood is attached to metal fabrications.

.4 Attach metal fabrications to interior concrete and masonry with corrosion resistant expansion bolts to support load with a safety factor of 3.

.5 Attach metal fabrications to exterior concrete and masonry with non-shrink epoxy grout to support load with a safety factor of 3.

.6 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.7 Install roof ladders to suit locations indicated complete with safety cages where required. Galvanized finish. Reinforce walls as required to receive roof ladders.

.8 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.9 Through bolt or cast-in ladder anchorage assemblies unless otherwise approved by authorities having jurisdiction.

3.3 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

3.4 Adjusting and Cleaning

.1 After erection, touch up primed surfaces that are burned, scratched or otherwise damaged with prime paint to match shop paint.

.2 Clean and repair areas of bare metal and welds on galvanized surfaces with zinc rich paint. Mask welded areas of members to minimize overpainting of adjacent undamaged surfaces. Prepare substrate to remove oil and grease in accordance with SSPC-SP1-16, rust scale in accordance with SSPC-SP3-18, mill scale in accordance with SSPC-SP6/NACE No. 3-07.

.3 Remove damaged, dented, defaced, defectively finished, or tool marked components and replace with new.

3.5 Metal Fabrications Schedule

.1 Refer to Miscellaneous Metals Schedule located on the drawings.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Work of this section includes architectural metal fabrications and related metals as set-out in the Miscellaneous Metals Schedule or as identified on the Drawings.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Submit engineered shop drawings.

.2 Submit a list of fabrications to be provided as part of the work of this section.

.3 Include plans, sections and large scale details, exposed-to-view edge conditions.

.4 Indicate materials, including material characteristics, profiles of each metal fabrication member, methods of assembly and joinery, fittings, fastenings, finishes, anchorages, welds, solders, brazing, and their structural characteristics relative to their purpose, accessory items, and other fabrication information required.

.5 Indicate proposed Site connections and methods.

.6 Submit coordination drawings indicating locations of concealed grounds, cutouts, plates, and other required fabrications.

.7 Show relation to adjoining construction, details of outside and inside corners and door openings.

.4 Samples:

.1 Submit 3 sets of samples of architectural metals and shop finished materials, show each type of finish and colour, 200 mm x 200 mm (8" x 8") size.

.2 Provide samples of welded joints showing quality of workmanship.

.3 Provide fastener samples for each type required.

.5 Mill certificates:

.1 Submit mill certificates signed by manufacturers of stainless steel certifying that Materials furnished comply with requirements of the Contract Documents.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Installers / applicators / erectors:

.1 Subcontractor, shop foreperson, and Site installation foreperson:

.1 Have adequate plant, equipment, and skilled tradespersons to perform work expeditiously.

.2 Has successfully completed installations similar to that specified during a period of at least the immediate past 10 years.

.3 Fabricators shall have experience working with all metal types specified in this section.

.2 Provide separation of stainless steel or non-ferrous metals fabrication areas from mild steel fabrication areas.

.3 Grinders, wire brushes, and tools used on stainless steel or non-ferrous metals shall be free of materials which will leave or produce dissimilar material or metal oxides deposits. Tools previously used on mild steel shall not be used on stainless steel or non-ferrous metal work.

.4 Do not bring iron or mild steel surfaces into contact with stainless steel or non-ferrous metals, including lifting tools, steel tables, storage racks, and other storage and handling equipment.

.5 Cutting or grinding debris from iron or mild steel materials shall not be permitted to settle on stainless steel or non-ferrous materials and fabrications.

.6 Perform water-wetting and drying tests during finishing indicating free iron on finished stainless work in accordance with ASTM A380-06.

.2 Mock-ups:

.1 Provide mock-ups, per the following list:

.1 GDRL-4: Painted metal picket guardrail face-fixed to deck edge with plate steel T-section.

.2 Perforated metal feature stair riser.

1.5 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of this section.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Design, fabricate, and install work of this section in accordance with the building code and requirements of authorities having jurisdiction.

.2 Welding:

.1 Steel: Weld components to conform to requirements of CSA W59-13, and by a fabricator fully certified by the Canadian Welding Bureau to conditions of CSA W47.1-09(R2014) and CSA W55.3-08 (R2013) as applicable.

.2 Stainless steel: Weld components to conform to requirements of CSA W59-24 and ANSI/AWS D1.6/D1.6M-2007 as applicable, and by a fabricator fully certified by the Canadian Welding Bureau to conditions of CSA W47.1-19.

.3 Design assemblies and connections to withstand own dead load, super-imposed dead loads, live load, and fabrication forces, without permanent distortions or deformation, to maximum allowable deflection of L/360, within the following construction tolerances:

.1 Edges and surfaces shall be uniform for like metalwork.

.2 Limit inconsistencies in edge and surfaces to those which can be identified when viewed from distance of not greater than 300 mm (12").

.3 Surfaces of panels shall be flat and free of distortion when viewed from any distance or angle from surface.

.4 Finish shall be uniform when viewed from any distance from surface or from like surfaces which are viewed from within the same viewing area.

.5 Limit variations from plumb and level:

.1 3.2 mm in 6096 mm (1/8" in 20'-0) vertically and horizontally.

.2 6.4 mm in 12192 mm (1/4" in 40'-0") either direction.

.6 Limit offsets in theoretical end-to-end and edge-to-edge alignment:

.1 1.6 mm (1/16”) where surfaces are flush or less than 12.7 mm (1/2") out of flush and separated by not more than 50 mm (2").

.2 3.2 mm (1/8") for surfaces separated by more than 50 mm (2").

.7 Step in face: 1.6 mm (1/16”) maximum.

.8 Jog in alignment: 1.6 mm (1/16”) maximum.

.9 Location: 6.4 mm (1/4") maximum deviation of any member at any location.

.10 Tolerances are not cumulative.

.4 Comply with NAAMM AMP 555-92 – Standard Practice for the Architectural Metal Industry (Including Miscellaneous Iron).

2.3 Materials

.1 General:

.1 Unless detailed or specified otherwise, standard Materials will be acceptable if construction details and installation meet requirements of the Contract Documents.

.2 Include materials, Materials, accessories, and supplementary parts necessary to complete assembly and installation of work of Section 05 50 10.

.3 Incorporate only metals that are free from defects that are visible, or that impair strength or durability. Install only new metals that are of best quality, free from rust or waves and buckles, clean, straight, with sharply defined profiles.

.1 Steel:

.1 Structural shapes, plate, bars: hot-rolled or cold-rolled to suit design requirements, in accordance with CSA G40.21-04, Grade 300W.

.2 Hollow structural sections: hot-formed or cold-formed to suit design requirements, seamless, in accordance with CSA G40.21-04, Grade 350W, Class H or Class C.

.3 Mild steel sheet and strip: hot rolled, in accordance with ASTM A1011/A1011M-10, Commercial.

.4 Cold rolled sheet: stretcher levelled, fully pickled, in accordance with ASTM A1008/A1008M-11, Grade CS Type A exposed, matte finish, oiled, unless otherwise indicated.

.5 Steel pipe: in accordance with ASTM A53 / A53M - 10, Type E or S, Grade A or B, standard weight, Schedule 40 seamless black or AISI MT 1010/1015.

.2 Perforated steel panels:

.1 Fabricate from 1.5 mm thick (16 gauge) cold rolled, stretcher levelled steel sheet.

.2 Openness: 40%.

.3 Holes: round, 3 mm (1/8") diameter.

.4 Pattern: spaced 5 mm (3/16") staggered centres.

.5 Finish: shop painted, colour as selected by Contract Administrator.

.3 Stainless steel:

.1 Type 304L unless otherwise indicated.

.2 Stainless steel tubing: in accordance with ASTM A269/A269M-22, Commercial Grade, seamless welded.

.3 Stainless steel sheet and plate: in accordance with ASTM A167-99(2009).

.4 Stainless steel bar and angle: in accordance with ASTM A276/A276M-23.

.5 Stainless steel seamless pipe: in accordance with ASTM A312/A312M-21.

2.4 Accessories

.1 Fasteners:

.1 Exposed fasteners to match the appearance of the surface on which they occur.

.2 For fastening steel: Zinc plated screws and bolts, and in accordance with ASTM A307-14e1, Type 304 stainless steel where exposed to exterior.

.3 For fastening stainless steel: same metal as that being fastened. Match finish of exposed heads with material being fastened.

.4 High strength bolts: in accordance with ASTM A325-14.

.5 Other types of fasteners as appropriate to meet design requirements.

.6 Fasteners shall be tamperproof where exposed.

.2 Welding materials:

.1 Steel: in accordance with CSA W59-13.

.2 Stainless steel: in accordance with ANSI/AWS D1.6/D1.6M-2017.

.3 Grout:

.1 Epoxy grout; non-shrink, non-expanding.

.1 Acceptable Materials:

.1 Hilti ‘HY-200’.

.2 Sika 'Sika AnchorFix 3001'.

.3 W.R. Meadows ‘REZI-WELD 3/2 EPOXY GROUT/PATCH’.

.2 Cementitious grout: non-shrink, non-expanding to ASTM C1107/C1107M-20:

.1 Acceptable Materials:

.1 Sika 'Sika Grout 212' or ‘Sika M-Bed Standard’.

.2 W.R. Meadows 'Sealtight CG-86 Construction Grout'.

.3 Substitutions: in accordance with Section 01 25 00.

.4 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

2.5 Finishes

.1 Shop primer; premium quality:

.1 Acceptable Materials:

.1 Sherwin Williams 'Pro Industrial Pro-Cryl Universal Primer', 0.0076 mm (3 mils) DFT.

.2 Zinc rich paint; steel: Two-component zinc-rich coating, zinc powder to ASTM D520 Type III ,SSPC-Paint 20, Type 1 Inorganic or single-component zinc-rich coating to SSPC-Paint, Type 2 Organic, CAN/CGSB 1.181-99, VOC content <100 g/l to ASTM-D1475.

.1 Acceptable Materials:

.1 Aervoe Industries, Inc. 'Low VOC Cold Galvanize Coating 93% Zinc'.

.2 ZRC Worldwide 'ZRC Zero-VOC Galvanizing Compound'.

.3 Substitutions: in accordance with Section 01 25 00.

.3 Hot dip galvanizing: for irregular sections, in accordance with ASTM A123/A123M-09, minimum zinc coating of 600 g/m². Use air cooling method (no water or chromate dipping treatment permitted).

.4 Stainless steel: AISI No. 4 brushed finish.

2.6 Fabrication

.1 General:

.1 Fabricate architectural metal fabrications with machinery and tools specifically designed for the intended manufacturing processes and by skilled tradesmen.

.2 Fit and assemble architectural metal fabrications in shop. When this is not possible, make a trial shop assembly.

.3 Incorporate means for fastenings of other work secured to work of this section.

.2 Construction:

.1 Fabricate with materials, component sizes, metal thicknesses (gauges), reinforcing, anchors, and fasteners of adequate strength to withstand intended use, and within allowable design factors imposed by jurisdictional authorities. Fabricate items from steel unless otherwise noted.

.2 Architectural metal fabrications shall remain free of warping, buckling, opening of joints and seams, distortion, and permanent deformation to expansion and contraction forces and loads.

.3 Construct items that are part of floor construction, such as gratings and trench covers, to support the same live loads for which surrounding construction is designed.

.4 Non-galvanized steel fabrications at exterior locations: *Provide* drainage holes at exterior exposed tubular fabrications to permit drainage of moisture to exterior of metal fabrications.

.3 Assembly:

.1 Accurately cut, machine and fit joints, corners, copes and mitres so that junctions between components fit together tightly and in true planes.

.2 Corners shall be mitred unless otherwise noted.

.3 Fasten work with concealed methods unless otherwise indicated.

.4 Weld connections where possible, bolt where not possible, and cut off bolts flush with nuts. Countersink bolt heads, and provide method to prevent loosening of nuts. Ream holes drilled for fastenings.

.1 Except where exposed to view:

.1 Finish welds shall comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #4 - Good quality, uniform undressed weld with minimal splatter as shown in NAAMM AMP 521.

.2 Where exposed to view:

.1 Weld behind finished surfaces without distorting or discolouring exposed side. Clean exposed welded joints of flux, and dress exposed and contact surfaces. Where welding cannot be concealed behind finished surfaces, finish joints to comply with NOMMA's "Joint Finish Guidelines", for “Finish #1 - no evidence of a welded joint”.

.5 Allow for differential movements within assemblies and at junctions of assemblies with surrounding work.

.6 Incorporate holes and connections for work installed under other sections.

.7 Cleanly and smoothly finish exposed edges of materials including holes.

.8 Cap open ends of sections exposed to view, such as pipes, channels, angles, and other similar work.

.4 Shop prime painting; premium quality:

.1 Clean loose mill scale, rust, dirt, weld flux and spatter from work after fabrication.

.2 Clean and prepare surfaces to meet specified requirements of SSPC SP-6 and paint manufacturer’s installation requirements.

.3 Apply primer in accordance with paint manufacturer’s installation requirements.

.5 Galvanizing:

.1 Galvanize metal fabrications following fabrication.

.2 Paint damaged galvanized surfaces with zinc rich paint, immediately following damage to galvanized protection. Prepare substrate to remove oil and grease to SSPC-SP1, rust scale to SSPC-SP3, mill scale to SSPC-SP6/NACE No. 3-07.

.3 At interior locations, fill vent and drain holes exposed in the finished *Work*, by plugging with zinc solder and filing off smooth.

.4 At exterior locations, except where indicated to remain as weep holes, fill vent and drain holes exposed in the finished *Work* by plugging with zinc solder and filing off smooth.

.6 Fabrications exposed to view:

.1 Fabrications exposed to view shall be of the highest architectural quality, free of scratches, pitting, roughness, marring, discolouration, seams, staining and other imperfections with the quality of workmanship conforming to the workmanship classifications of Class 1 as defined in NAAMM-AMP 555-92, paragraph 8.3 of Section 8, Quality Control or Assurance and as follows:

.1 Exposed surfaces are finished smooth with pits, mill marks, nicks and scratches filled or ground off. Defects shall not show when painted or polished. Remove sharp corners and edges.

.2 Conceal welds where possible. Where exposed, grind welds to small radius with uniform sized cove. Welds shall appear continuous in appearance. When painted or polished welds shall be undetectable.

.3 Use only flat head countersunk bolts in exposed locations unless indicated otherwise.

.4 Distortions shall not be visible to the eye.

.5 Exposed joints shall be fitted to hairline finish.

.2 Assemble items in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

.3 Form decorative metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.

.4 Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the work.

.5 Form simple and compound curves in bars, pipe, tubing, and extruded shapes by bending members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces.

.6 Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1 mm (0.040") unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

.7 Mill joints to a tight, hairline fit. Cope or mitre corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.

.8 Surface preparation; non-ferrous metals: Remove tool and die marks and stretch lines, or blend into finish. Grind and polish surfaces to produce uniform finish, free of cross scratches. Run grain of directional finishes with long dimension of each piece.

PART 3 - EXECUTION

3.1 Examination

.1 Take measurements at the Site to verify that architectural metal fabrications fit surrounding construction, around obstructions and projections in place, or as indicated, and to suit service locations.

.2 Inspect surfaces on which work of this section is dependent for any irregularities detrimental to installation and performance of the work of this section. Confirm conditions are satisfactory before proceeding.

3.2 Installation

.1 Install work plumb, true, square, straight, level, and accurately and tightly fitted together and to surrounding Work and as required for proper performance.

.2 Supply and install anchor bolts, high tensile bolts, washers and nuts, expansion bolts, toggles, straps, sleeves, brackets, clips, and other items necessary for secure installation as required by loading and jurisdictional authorities.

.3 Countersink holes at wood screws where wood is attached to work of this section.

.4 Attach metal fabrications to interior concrete and masonry with corrosion resistant expansion bolts to support load with a safety factor of 3.

.5 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.6 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.7 Erect members and component parts plumb, level and true to building lines, in correct relation to work of other sections and established lines, curves and levels indicated.

.8 Securely anchor metal framing to concrete by means of anchor rods with epoxy adhesive, shim and pack to true straight lines and levels.

.9 Field welding:

.1 Comply with applicable specification for procedures of manual shielded metal arc welding and requirements for welding and for finishing welded connections given above in this section.

.2 Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

.10 Fasten railing anchors at the Site. Coordinate with related Subcontractors.

3.3 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00 and as follows:

.1 Inspection and testing:

.1 Ferroxyl test for free iron in accordance with ASTM A380/A380M-17 in the fabrication shop and on site.

.2 If test results or inspections show stainless steel work to be contaminated with free iron or other impurity which can lead to discolouration of stainless steel work when exposed to moisture, remove and replace or repair the stainless steel work in accordance with recommendation of Nickel Development Institute and as required to provide stainless steel which meets the requirements of this section.

.3 Testing shall be performed by independent inspection and testing company.

3.4 Adjusting and Cleaning

.1 After erection, touch up primed surfaces that are burned, scratched or otherwise damaged with prime paint to match shop paint.

.2 Remove damaged, dented, defaced, defectively finished, or tool marked components and replace with new.

.3 Clean and polish surfaces after installation is complete. Use only materials that will not scratch or mar finished surfaces and as approved by material manufacturers.

3.5 Architectural Metal Fabrications Schedule

.1 Refer to Miscellaneous Metals Schedule located on the drawings.

END OF SECTION

PART 1 – GENERAL

1.1 Definitions

.1 Boards or Strips:
Lumber of less than 38mm in least dimension.

.2 Contract Administrator:
The Contract Administrator is the person or entity engaged by the City and identified as such in the Contract. The Contract Administrator is the Architect, the Engineer, or the entity licensed to practice in the province or territory of the Place of Work. The term Contract Administrator means the Contract Administrator or the Contract Administrator's authorized representative.

.3 Contract Documents:
Drawings, Specifications, and all other documents and amendments which form part of the Contract.

.4 Contractor:
The term Contractor means the Contractor or the Contractor's authorized representative as designated to the City in writing. The term Contractor is defined to include any of the following: Construction Manager, General Contractor, Subcontractor, or Supplier.

.5 Dimension Lumber:
Lumber of 38mm or greater but less than 114mm in least dimension.

.6 City:
The City is the person or entity identified as such in the Contract. The term City means the City or the City's authorized agent or representative as designated to the Contractor in writing but does not include the Contract Administrator.

1.2 Work Included

.1 Comply with Division 01 – General Requirements and all documents referred to therein.

.2 Section includes framing with dimension lumber.

.3 Provide all labour and materials to complete the Work indicated in the Contract Documents and specified in this Section.

1.3 Related Work Specified Elsewhere

.1 Section 06 12 00 "Structural Insulated Panels."

.2 Section 06 13 00 "Heavy Timber Framing" for framing with lumber of 114mm or greater.

.3 Section 06 15 29 "Nail-Laminated Timber."

.4 Section 06 16 00 "Sheathing."

.5 Section 06 17 19 "Cross-Laminated Timber."

.6 Section 06 17 29 "Structural Composite Lumber."

.7 Section 06 17 33 "Wood I-Joists."

.8 Section 06 17 53 "Shop-Fabricated Wood Trusses."

.9 Section 06 17 63 “Dowel-Laminated Timber.”

.10 Section 06 18 19 “Glued-Laminated Timber Framing.”

.11 Section 06 18 29 “Glued-Laminated Timber Panels.”

1.4 Reference Standards, Codes, and Acts

.1 Conform to the requirements of the local building code identified on the structural Drawings as amended by all subsequent regulations issued to the date of this Specification and applicable acts of authorities having jurisdiction.

.2 All references to the standards and publications noted in this Specification shall be to the edition referenced in the local building code identified on the structural Drawings, or to the edition referenced in the latest published editions or revisions of all standards published by the Canadian Standards Association issued to the date of this Specification, whichever is the later edition or revision.

.3 All references to the standards and publications noted in this Specification which are not referenced by the local building code or by the standards published by the Canadian Standards Association shall be to the latest edition and revision published to the date of this Specification.

.4 Standards referenced by the publications noted in this Specification apply even if they are not included in the list. Where such reference is made, it shall be to the latest edition and revision published.

.5 Where there are differences between the Contract Documents and the standards, codes, or acts, the most stringent provisions govern.

.6 References:

.1 ASME B18.2.1 Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws.

.2 ASME B18.6.1 Wood Screws.

.3 ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.4 ASTM A307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.

.5 ASTM A563 Standard Specification for Carbon and Alloy Steel Nuts.

.6 ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.7 ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

.8 ASTM D2898 Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing.

.9 ASTM D3201/D3201M Standard Test Method for Hygroscopic Properties of Fire-Retardant Wood and Wood-Based Products.

.10 ASTM D5664 Standard Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant-Treated Lumber.

.11 ASTM D6841 Standard Practice for Calculating Design Value Treatment Adjustment Factors for Fire-Retardant-Treated Lumber.

.12 ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.

.13 ASTM F1667 Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.14 AWPA M2 Standard for the Inspection of Preservative-Treated Products for Industrial Use.

.15 AWPA M4 Standard for the Care of Preservative-Treated Wood Products.

.16 CAN/ULC S101 Standard Methods of Fire Endurance Tests of Building Construction and Materials.

.17 CSA B111 Wire Nails, Spikes and Staples.

.18 CSA G40.20-13/G40.21 General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.

.19 CSA O80 Series-15 Wood Preservation.

.20 CSA O86 Engineering Design in Wood.

.1 CSA O141 Softwood Lumber.

.21 NLGA (National Lumber Grades Authority) Standard Grading Rules for Canadian Lumber.

.22 ULC Fire Resistance Directory.

1.5 Performance Requirements

.1 Fire-Resistance Ratings: As tested in accordance with CAN/ULC S101; testing by a qualified agency.

.1 Identify products with appropriate markings of applicable testing agency.

.2 Indicate design designations from ULC's "Fire Resistance Directory" or from the listings of another qualified testing agency.

1.6 Submittals for Review

.1 Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

.1 Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

.2 Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials.

.3 For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.

.4 For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

.5 For connectors, include installation instructions.

.2 Samples: One of each different type of wood member exposed to view, minimum 300mm in size, illustrating wood grain, stain, and finish.

.3 Provide letter outlining steps to be taken during construction to ensure adequate weather protection of wood structures.

1.7 Submittals for Information

.1 Material Certificates: Issued by an approved grading agency.

.1 For dimension lumber specified to comply with minimum allowable unit stresses, indicate species, grade, and design values for each use.

.2 For exposed items, omit grade stamp and provide certificates as to species, grade, stress grade, seasoning, moisture content, and other evidence as required to show compliance with the Specifications.

.2 Evaluation Reports: For the following, from CCMC or ICC-ES:

.1 Wood-preservative-treated lumber.

.2 Fire-retardant-treated lumber.

.3 Power-driven fasteners.

.4 Post-installed anchors.

.5 Metal framing anchors.

.3 Qualification Data: For installer and testing agency.

1.8 Quality Assurance

.1 Grading Agencies: Certified by NLGA.

.2 Installer Qualifications: Company specializing in performing the Work of this Section with minimum three years of experience.

.3 Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.9 Delivery, Storage, and Protection

.1 Protect wood products from weather during transit to Project site.

.2 Stack wood products flat with spacers beneath and between each bundle to provide air circulation.

.3 Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 – PRODUCTS

2.1 Dimension Lumber Framing

.1 Grading Rules: NLGA. All softwood lumber shall conform to CSA O141 and CSA O86.

.1 Factory mark each piece of lumber with grade stamp of grading agency unless noted otherwise.

.2 Do not grade stamp lumber exposed to view. Deliver to site with certificates as to species, grades, stress grades, seasoning, moisture content, and other evidence as required to show compliance with the Specifications.

.2 Dress lumber, S4S, unless noted otherwise.

.3 Maximum Moisture Content: 19% unless noted otherwise.

.4 Studs and Built-Up Posts: SPF #2, or any species and grade with minimum design values as follows:

.1 Modulus of elasticity, E: 9,500 MPa.

.2 Bending, F_b: 11.8 MPa.

.3 Compression parallel to grain, F_c: 11.5 MPa.

.5 Top Plates, Bottom Plates, and Nailers: D.Fir-L #2, or any species and grade with minimum design values as follows:

.1 Modulus of elasticity, E: 11,000 MPa.

.2 Bending, F_b: 10.0 MPa.

.3 Compression perpendicular to grain, $F_{c\perp}$: 7.0 MPa.

.6 Joists, Built-Up Beams, and Blocking: SPF #2, or any species and grade with minimum design values as follows:

.1 Modulus of elasticity, E: 9,500 MPa.

.2 Bending, F_b: 11.8 MPa.

.7 Solid Wood Posts and Beams: D.Fir-L #1, or any species and grade with minimum design values as follows:

.1 Modulus of elasticity, E: 10,500 MPa.

.2 Bending, F_b: 15.8 MPa.

.3 Compression parallel to grain, F_c: 11.0 MPa.

.8 Strapping and Nailing Strips: Hem-Fir Construction Grade, or any species and grade with minimum design values as follows:

.1 Modulus of elasticity, E: 10,000 MPa.

.2 Bending, Fb: 14.3 MPa.

2.2 Wood-Preservative-Treated Lumber

.1 Preservative Treatment by Pressure Process: CSA O80; Use Category UC2 for interior construction not in contact with ground, Use Category UC3.2 for exterior construction not in contact with ground, and Use Category UC4.1 for items in contact with ground.

.1 Preservative chemicals must be acceptable to authorities having jurisdiction and contain no arsenic or chromium.

.2 For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

.3 For exposed items indicated to receive an applied finish, use process that does not include water repellents or other substances that might interfere with application of indicated finishes.

.4 For items that will remain unfinished, use process that includes water-repellent treatment.

.5 After treatment, redry materials to a maximum moisture content of 19%. Do not use material that is warped or that does not comply with requirements for untreated material.

.2 Mark treated materials with treatment quality mark of an inspection agency acceptable to authorities having jurisdiction. For exposed items indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

.3 Treat items only as indicated on the Drawings.

.4 Any fasteners in contact with treated wood must be hot-dip galvanized or stainless steel.

2.3 Fire-Retardant-Treated Materials

.1 Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

.2 Fire-Retardant-Treated Lumber by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 3.2 meters beyond the centerline of the burners at any time during the test.

.1 Use treatment that does not promote corrosion of metal fasteners.

.2 Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber by pressure process after being subjected to accelerated weathering in accordance with ASTM D2898. Use for exterior locations and where indicated.

.3 Interior Type A: Treated materials shall have a moisture content of 28% or less when tested in accordance with ASTM D3201 at 92% relative humidity. Use where exterior type is not indicated.

.4 Design Value Adjustment Factors: Treated lumber shall be tested in accordance with ASTM D5664, and design value adjustment factors shall be calculated in accordance with ASTM D6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.

.3 Treated lumber shall be tested according to ASTM D5664 and design value adjustment factors shall be calculated according to ASTM D6841.

.4 Kiln-dry lumber after treatment to a maximum moisture content of 19%. Do not use material that is warped or does not comply with requirements for untreated material.

.5 Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency. For exposed items indicated to receive a stained or natural finish, mark end or back of each piece, or omit marking and provide certificates of treatment compliance issued by testing agency.

.6 For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.

.7 Treat items only as indicated on the Drawings.

2.4 Miscellaneous Lumber

.1 Provide miscellaneous lumber indicated and for support or attachment of other construction, including the following:

.1 Blocking.

.2 Nailers.

.3 Rooftop equipment bases and support curbs.

.4 Cants.

.5 Furring.

.2 For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.

.3 For blocking and nailers, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

.4 For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 Fasteners

.1 Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Where rough carpentry is exposed to weather (during or after construction), in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153 or of Type 304 stainless steel.

.2 Nails, Spikes, and Staples: ASTM F1667.

.3 Power-Driven Fasteners: Fasteners with a CCMC or ICC-ES evaluation report acceptable to authorities having jurisdiction.

.4 Through Bolts and Anchor Bolts: ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers, hot dip galvanized to ASTM A153.

.5 Wood Screws: ASME B18.6.1 or as specified on the Drawings.

.6 Lag Screws: ASME B18.2.1.

.1 All lag screws to be machined threaded, not cast threaded.

.2 Pre-drilled hole sizes in wood members for lag screws to be in accordance with CSA O86.

.3 Lag screws are acceptable only where specifically indicated on the Drawings. Do not substitute lag screws for self-tapping wood screws.

.7 Post-Installed Anchors: Fastener systems with a CCMC or ICC-ES evaluation report acceptable to authorities having jurisdiction.

2.6 Metal Framing Anchors

.1 Provide products with design loads, as published by manufacturer, that meet or exceed those indicated.

.1 Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

.2 Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

.3 Provide framing anchors with minimum metal thickness of 1.3mm unless noted otherwise.

.2 Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653, Z180 (G60) coating designation. Use for interior locations unless noted otherwise.

.3 Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653; structural steel (SS), high-strength low-alloy steel Type A, or high-strength low-alloy steel Type B; Z550 (G185) coating designation; and not less than 0.91mm thick. Use for wood-preservative-treated lumber and where indicated.

.4 Stainless Steel Sheet: ASTM A666, Type 304 or Type 316. Use for exterior locations and where indicated.

.5 Steel Plate: CSA G40.20/G40.21, Grade 300W. Use where indicated.

.6 Joist Hangers: U-shaped joist hangers with 50mm-long seat and 32mm-wide nailing flanges at least 85% of joist depth, minimum capacity 4.5 kN.

.7 I-Joist Hangers: U-shaped joist hangers with 50mm-long seat and 32mm-wide nailing flanges full depth of joist, minimum capacity 4.5 kN. Nailing flanges provide lateral support at joist top chord.

.8 Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member minimum 38mm wide.

.9 Bridging: Rigid, V-section, nailless type, length to suit joist size and spacing.

.10 Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 25mm above base and with 50mm minimum side cover, socket 1.6mm thick, and standoff and adjustment plates 2.8mm thick.

.11 Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports, minimum 32mm wide by 600mm long.

.12 Rafter Tie-Downs: Bent strap tie for fastening rafters to wall studs below, minimum 38mm wide.

.13 Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters to wall studs below, 57mm wide by 1.6mm thick. Tie fits over top of rafter and fastens to both sides of rafter or truss, face of top plates, and side of stud below.

.14 Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 32mm wide by 900mm long unless noted otherwise.

.15 Hold-Downs: As indicated on the Drawings.

2.7 Miscellaneous Materials

.1 Moisture Barrier: Any of the following:

.1 Light gauge metal.

.2 Asphalt-impregnated building paper.

.3 Closed-cell foam gasket material, 6mm thick

.4 Saturated felt roll roofing.

.5 Polyethylene, 6 mil thick.

.2 Proprietary Products:

.1 Proprietary products shown on the Drawings have been selected and specified based on the manufacturer’s representation.

.2 The Contract Administrator shall not become guarantor of the product.

.3 Install proprietary products in strict conformance with the manufacturer’s recommendations.

.4 Contractor is responsible for proper workmanship during installation.

PART 3 – EXECUTION

3.1 Examination

.1 Examine supporting construction in areas to receive wood framing, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of the Work.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation, General

.1 Comply with Part 9 of the National Building Code of Canada unless noted otherwise.

.2 Provide temporary shores, guys, braces, and other supports during erection to keep wood framing secure, plumb, and in alignment against wind loads, seismic loads, temporary construction loads, and loads equal in intensity to design loads.

.1 Any failure to make proper and adequate provisions for stresses during erection shall be solely the responsibility of the Installer.

.2 Fasteners required for erection purposes are the responsibility of the Contractor and are to be included in the bid.

.3 Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

.1 Fit rough carpentry accurately to other construction.

.2 Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

.4 Coordinate placement of sheathing and decking with Work of this Section.

.5 Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

.6 Install sill sealer gasket to form continuous seal between sill plates and foundation walls. At all other locations where wood framing abuts concrete or masonry construction, provide moisture barrier.

.7 Do not splice structural members between supports unless noted otherwise.

.8 Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.

.9 Where Drawings indicate compression members consisting of multiple laminations, fasten laminations in accordance with CSA O86.

.10 Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

.1 Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels.

.2 Space clips not more than 400mm o.c.

.11 Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

.1 Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 2.4 meters o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.

.2 Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 2.4 meters o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 38mm thickness.

.3 Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 10 sq.m and to solidly fill space below partitions.

.4 Fire block concealed spaces behind combustible cornices and exterior trim at not more than 6 meters o.c.

.12 Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

.13 Comply with AWPA M4 and revisions specified in CSA O80 Series, Supplementary Requirements to AWPA M2 for applying field treatment to cut surfaces of preservative-treated lumber.

.1 Use inorganic boron for items that are continuously protected from liquid water.

.2 Use copper naphthenate for items not continuously protected from liquid water.

.14 Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

.15 Securely attach to substrate by anchoring and fastening as indicated, complying with the following:

.1 Table 9.23.3.4, "Nailing for Framing," in Part 9 of the National Building Code of Canada.

.2 CCMC or ICC-ES evaluation report fastener.

.16 Use common steel wire nails unless noted otherwise.

.1 Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials.

.2 Make tight connections between members.

.3 Install fasteners without splitting wood.

.4 Drive nails snug but do not countersink nail heads unless noted otherwise.

.17 Substitution of common nails with power-driven nails of the same length and diameter is acceptable. Substitution of power-driven nails of smaller diameter is permitted only with the Contract Administrator’s approval.

.1 Set nail gun pressure so that nail heads do not crush wood surface.

.2 Nail head penetration shall not exceed 2mm.

.18 For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

.1 Comply with approved fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.

.2 Use finishing nails unless noted otherwise. Countersink nail heads and fill holes with wood filler.

3.3 Wall And Partition Framing Installation

.1 Provide single bottom plate and double top plates using members of 38mm thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs.

.1 Fasten plates to supporting construction unless noted otherwise.

.2 Provide continuous horizontal blocking at midheight of partitions more than 2.4 meterse high, using members of 38mm thickness and of same width as wall or partitions.

.2 Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.

.3 Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.

.1 For non-load-bearing partitions, provide double-jamb studs and headers not less than 89mm depth for openings 1.2 meters and less in width, 140mm depth for openings 1.2 meters to 1.8 meters in width, 184mm depth for openings 1.8 meters to 3 meters in width, and not less than 235mm depth for openings 3 meters to 3.6 meters in width.

.2 For load-bearing walls, provide double-jamb studs for openings 1.5 meters and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated or, if not indicated, according to Tables A-12 to A-16 in Part 9 of the National Building Code of Canada.

.4 Laminate studs solid beneath all beam ends and carry through to concrete foundation below.

.1 Unless noted otherwise, built-up studs shall match number of laminations in built-up member being supported.

.2 Fully block all joist spaces below point loads.

.3 Take care to ensure beams bear fully on supporting members.

3.4 Floor Joist Framing Installation

.1 Install floor joists with crown edge up and support ends of each member with not less than 38mm of bearing on wood or metal, or 75mm on masonry. Attach floor joists as follows:

.1 Where supported on wood members, by toe nailing or by using metal framing anchors.

.2 Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.

.2 Provide fire cuts for joists built into masonry.

.1 Bevel cut ends 75mm.

.2 Do not embed more than 100mm.

.3 Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 1.2 meters.

.4 Limit holes and notches as follows:

.1 Do not notch in middle third of joists.

.2 Limit notches to one-sixth depth of joist, one-fourth at ends.

.3 Do not bore holes larger than one-third depth of joist.

.4 Do not locate holes closer than 50mm from top or bottom.

.5 Provide solid blocking of 38mm thickness by depth of joist at ends of joists unless nailed to header or band.

.6 Lap members framing from opposite sides of beams, girders, or partitions not less than 100mm or securely tie opposing members together. Provide solid blocking of 38mm thickness by depth of joist over supports.

.7 Anchor members paralleling masonry with 6.4mm by 32mm metal strap anchors spaced not more than 2.4 meters o.c., extending over and fastening to three joists. Embed anchors at least 100mm into grouted masonry with ends bent at right angles and extending 100mm beyond bend.

.8 Provide solid blocking between joists under jamb studs for openings.

.9 Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.

.10 Provide solid blocking or bridging of either type indicated below, at intervals of 1.8 meters o.c., between joists spanning more than 3 meters.

.1 Diagonal wood bridging formed from bevel-cut, 19mm by 64mm lumber, double-crossed and nailed at both ends to joists.

.2 Steel bridging installed to comply with bridging manufacturer's written instructions.

3.5 Ceiling Joist And Rafter Framing Installation

.1 Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.

.1 Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate, and nail to first joist or anchor with framing anchors or metal straps.

.2 Provide 19mm by 184mm or 38mm by 89mm stringers spaced 1.2 meters o.c. crosswise over main ceiling joists.

.2 Notch rafters to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers.

.1 Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.

.2 At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 50mm deeper. Bevel ends of jack rafters for full bearing against valley rafters.

.3 At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 50mm deeper. Bevel ends of jack rafters for full bearing against hip rafter.

.3 Provide collar beams (ties) as indicated or, if not indicated, provide 19mm by 140mm boards between every third pair of rafters, but not more than 1.2 meters o.c.

.1 Locate below ridge member, at third point of rafter span.

.2 Cut ends to fit roof slope and nail to rafters.

.4 Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.6 Wood Blocking And Nailer Installation

.1 Install where indicated and where required for attaching other work.

.2 Form to shapes indicated and cut as required for true line and level of attached work.

.3 Coordinate locations with other work involved.

.4 Attach items to substrates to support applied loading.

.5 Recess bolts and nuts flush with surfaces unless noted otherwise.

3.7 Wood Furring Installation

.1 Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

.2 Furring to Receive Plywood or Hardboard Paneling: 19mm by 63mm furring horizontally and vertically at 600mm o.c.

.3 Furring to Receive Gypsum Board: 19mm by 38mm furring vertically at 400mm o.c.

3.8 Erection Tolerances

.1 For rectangular floor areas, the corner-to-corner diagonal measurements should not deviate from each other by more than 13mm or 0.25% of the length of the shortest side of the rectangle, whichever is greater.

.2 Posts:

.1 Plumbness: 0.25% of post height (1:400) maximum deviation from plumb.

.2 Position: plus or minus 10mm from theoretical at base in both directions.

.3 Walls:

.1 Plumbness: 0.25% of wall height (1:400) maximum deviation from plumb measured at any point along the wall.

.2 Position: plus or minus 10mm from theoretical at base.

.3 Length: plus or minus 10mm from theoretical.

.4 Stud Spacing: plus or minus 16mm from specified.

.4 Floors and Roofs:

.1 Overall Surface Levelness (Floors and Flat Roofs): 6mm in 3 meters maximum measured at any two points.

.2 Individual Joist Levelness (Floors and Flat Roofs): 6mm in 3 meters maximum.

.3 Elevation: plus or minus 10mm from theoretical.

.4 Joist Spacing: plus or minus 16mm from specified.

3.9 Quality Control

.1 Provide a system of quality control to ensure that the minimum standards specified in the Contract Documents are attained.

.2 Bring to the attention of the Contract Administrator any defects in the Work or departures from the Contract Documents which may occur during Construction. The Contract Administrator will decide upon corrective action and give recommendations in writing.

.3 The Contract Administrator's general review during construction are both undertaken to inform the City of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve the Contractor of its contractual responsibilities with respect to quality control.

3.10 Notification

.1 Prior to commencing significant segments of the Work, give the Contract Administrator appropriate notification so as to afford them reasonable opportunity to review the Work. Failure to meet this requirement may be cause for the Contract Administrator to classify the Work as defective.

3.11 Defective Materials And Work

.1 Where evidence exists that defective Work has occurred or that Work has been carried out incorporating defective materials, the Contract Administrator may have tests, inspections or surveys performed, analytical calculations of structural strength made and the like in order to help determine whether the Work must be replaced. Tests, inspections or surveys or calculations carried out under these circumstances will be made at the Contractor's expense, regardless of their results, which may be such that, in the Contract Administrator's opinion, the Work may be acceptable.

.2 All testing shall be conducted in accordance with the requirements of the Building Code, except where this would, in the Contract Administrator's opinion, cause undue delay or give results not representative of the rejected material in place. In this case, the tests shall be conducted in accordance with the standards given by the Contract Administrator.

.3 Materials or Work which fail to meet specified requirements may be rejected by the Contract Administrator whenever found at any time prior to the Total Performance of the Work regardless of previous inspection. If rejected, defective materials or Work shall be promptly removed and replaced or repaired to the satisfaction of the Contract Administrator, at no expense to the City.

END OF SECTION

PART 1 – GENERAL

1.1 Definitions

.1 Contract Administrator:
The Contract Administrator is the person or entity engaged by the City and identified as such in the Contract. The Contract Administrator is the Architect, the Engineer, or the entity licensed to practice in the province or territory of the Place of Work. The term Contract Administrator means the Contract Administrator or the Contract Administrator's authorized representative.

.2 Contract Documents:
Drawings, Specifications, and all other documents and amendments which form part of the Contract.

.3 Contractor:
The term Contractor means the Contractor or the Contractor's authorized representative as designated to the City in writing. The term Contractor is defined to include any of the following: Construction Manager, General Contractor, Subcontractor, or Supplier.

.4 City:
The City is the person or entity identified as such in the Contract. The term City means the City or the City's authorized agent or representative as designated to the Contractor in writing but does not include the Contract Administrator.

1.2 Work Included

.1 Comply with Division 01 – General Requirements and all documents referred to therein.

.2 Section includes:

.1 Wall sheathing.

.2 Parapet sheathing.

.3 Floor sheathing.

.4 Floor underlayment.

.5 Roof sheathing.

.3 Provide all labour and materials to complete the Work indicated in the Contract Documents and specified in this Section.

1.3 Related Work Specified Elsewhere

.1 Section 06 10 00 "Rough Carpentry" for dimension lumber framing.

.2 Section 06 13 00 "Heavy Timber Framing" for framing with lumber of 114mm or greater.

.3 Section 06 15 29 "Nail-Laminated Timber."

.4 Section 06 17 29 "Structural Composite Lumber."

.5 Section 06 17 33 "Wood I-Joists."

.6 Section 06 17 53 "Shop-Fabricated Wood Trusses."

.7 Section 06 17 63 “Dowel-Laminated Timber.”

.8 Section 06 18 19 “Glued-Laminated Timber Framing.”

.9 Section 06 18 29 “Glued-Laminated Timber Panels.”

1.4 Reference Standards, Codes, and Acts

.1 Conform to the requirements of the local building code identified on the structural Drawings as amended by all subsequent regulations issued to the date of this Specification and applicable acts of authorities having jurisdiction.

.2 All references to the standards and publications noted in this Specification shall be to the edition referenced in the local building code identified on the structural Drawings, or to the edition referenced in the latest published editions or revisions of all standards published by the Canadian Standards Association issued to the date of this Specification, whichever is the later edition or revision.

.3 All references to the standards and publications noted in this Specification which are not referenced by the local building code or by the standards published by the Canadian Standards Association shall be to the latest edition and revision published to the date of this Specification.

.4 Standards referenced by the publications noted in this Specification apply even if they are not included in the list. Where such reference is made, it shall be to the latest edition and revision published.

.5 Where there are differences between the Contract Documents and the standards, codes, or acts, the most stringent provisions govern.

.6 References:

.1 APA AFG-01 Adhesives for Field-Gluing Plywood to Wood Framing.

.2 ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.3 ASTM C954 Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84mm) to 0.112 in (2.84mm) in Thickness.

.4 ASTM C1002 Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.5 ASTM D2898 Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing.

.6 ASTM D3201/D3201M Standard Test Method for Hygroscopic Properties of Fire-Retardant Wood and Wood-Based Products.

.7 ASTM D3498 Standard Specification for Adhesives for Field Gluing Plywood to Lumber Framing for Floor Systems.

.8 ASTM D5516 Standard Test Method for Evaluating the Flexural Properties of Fire-Retardant Treated Softwood Plywood Exposed to Elevated Temperatures.

.9 ASTM D6305 Standard Practice for Calculating Bending Strength Design Adjustment Factors for Fire-Retardant-Treated Plywood Roof Sheathing.

.10 ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.

.11 ASTM F1667 Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.12 CANPLY (Canadian Plywood Association) Grading and Certification.

.13 CAN/ULC S101 Standard Methods of Fire Endurance Tests of Building Construction and Materials.

.14 CSA O80 Series-15 Wood Preservation.

.15 CSA O86 Engineering Design in Wood.

.16 CSA O121 Douglas Fir Plywood.

.17 CSA O325 Construction Sheathing.

.18 ULC Fire Resistance Directory.

1.5 Performance Requirements

.1 Fire-Resistance Ratings: As tested in accordance with CAN/ULC S101; testing by a qualified agency.

.1 Identify products with appropriate markings of applicable testing agency.

.2 Indicate design designations from ULC's "Fire Resistance Directory" or from the listings of another qualified testing agency.

1.6 Submittals for Review

.1 Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

.1 Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated sheathing complies with requirements. Indicate type of preservative used and net amount of preservative retained.

.2 Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated sheathing complies with requirements. Include physical properties of treated materials.

.3 For fire-retardant treatments, include physical properties of treated sheathing both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5516.

.4 For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

.2 Provide letter outlining steps to be taken during construction to ensure adequate weather protection of wood structures.

1.7 Submittals for Information

.1 Evaluation Reports: For the following, from CCMC or ICC-ES:

.1 Wood-preservative-treated sheathing.

.2 Fire-retardant-treated sheathing.

.2 Qualification Data: For installer and testing agency.

1.8 Quality Assurance

.1 Installer Qualifications: Company specializing in performing the Work of this Section with minimum three years of experience.

.2 Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.9 Delivery, Storage, and Protection

.1 Protect panels from weather during transit to Project site.

.2 Stack panels flat with spacers beneath and between each bundle to provide air circulation.

.3 Protect panels from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 – PRODUCTS

2.1 Sheathing

.1 Wall and Parapet Sheathing: Plywood or Oriented Strand Board (OSB), exterior grade.

.1 Plywood: CSA O121.

.2 OSB: CSA O325.

.3 Nominal Thickness: Not less than 12.5mm.

.2 Floor Sheathing: Plywood or Oriented Strand Board (OSB), exterior grade.

.1 Plywood: CSA O121.

.2 OSB: CSA O325.

.3 Nominal Thickness: Not less than 15.5mm.

.4 Edges: Tongue and groove.

.3 Floor Underlayment: Plywood underlayment in nominal thicknesses indicated or, if not indicated, not less than 7.5mm over smooth subfloors and not less than 9.5mm over board or uneven subfloors.

.1 Underlayment for Resilient Flooring: CSA O121, Exterior, Good One Side.

.2 Underlayment for Ceramic Tile: CSA O121, Exterior, Select Tight Face, not less than 15.5mm nominal thickness.

.3 Underlayment for Carpet: CSA O121, Exterior, Select Tight Face.

.4 Roof Sheathing: Plywood or Oriented Strand Board (OSB), exterior grade.

.1 Plywood: CSA O121.

.2 OSB: CSA O325.

.3 Nominal Thickness: Not less than 12.5mm.

.4 Edges: Provide H-clips between each panel.

.5 Factory mark panels to indicate compliance with applicable standard.

2.2 Preservative-Treated Sheathing

.1 Preservative Treatment by Pressure Process: CSA O80; Use Category UC2 for interior construction not in contact with ground, Use Category UC3.2 for exterior construction not in contact with ground, and Use Category UC4.1 for items in contact with ground. Preservative chemicals must be acceptable to authorities having jurisdiction and contain no arsenic or chromium.

.2 Mark treated materials with treatment quality mark of an inspection agency acceptable to authorities having jurisdiction.

.3 Treat items only as indicated on the Drawings. Any fasteners in contact with treated wood must be hot-dip galvanized or stainless steel.

2.3 Fire-Retardant-Treated Sheathing

.1 Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

.2 Fire-Retardant-Treated Sheathing by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 3.2 meters beyond the centerline of the burners at any time during the test.

.1 Use treatment that does not promote corrosion of metal fasteners.

.2 Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated sheathing by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.

.3 Interior Type A: Treated materials shall have a moisture content of 28% or less when tested according to ASTM D3201 at 92% relative humidity. Use where exterior type is not indicated.

.4 Design Value Adjustment Factors: Treated sheathing shall be tested according to ASTM D5516, and design value adjustment factors shall be calculated according to ASTM D6305. Span ratings after treatment shall be not less than span ratings specified. For roof sheathing and where high-temperature fire-retardant treatment is indicated, span ratings for temperatures up to 76°C shall be not less than span ratings specified.

.3 Kiln-dry material after treatment to maximum moisture content of 15%. Do not use material that is warped or does not comply with requirements for untreated material.

.4 Identify fire-retardant-treated sheathing with appropriate classification marking of qualified testing agency.

.5 Treat items only as indicated on the Drawings.

2.4 Fasteners

.1 Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Where sheathing is exposed to weather (during or after construction), in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153 or of Type 304 stainless steel.

.2 Nails, Brads, and Staples: ASTM F1667.

.3 Power-Driven Fasteners: Fasteners with a CCMC or ICC-ES evaluation report acceptable to authorities having jurisdiction.

.4 Screws for Fastening Sheathing to Wood Framing: ASTM C1002.

.5 Screws for Fastening Sheathing to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

2.5 Miscellaneous Materials

.1 Adhesives for Field Gluing Panels to Wood Framing: ASTM D3498 or APA AFG-01, approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

.2 Proprietary Products:

.1 Proprietary products shown on the Drawings have been selected and specified based on the manufacturer’s representation.

.2 The Contract Administrator shall not become guarantor of the product.

.3 Install proprietary products in strict conformance with the manufacturer’s recommendations.

.4 Contractor is responsible for proper workmanship during installation.

PART 3 – EXECUTION

3.1 Examination

.1 Examine supporting construction in areas to receive sheathing, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of the Work.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

.1 Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

.2 Cut panels at penetrations, edges, and other obstructions of work. Fit tightly against abutting construction unless noted otherwise.

.3 Securely attach sheathing to substrate by anchoring and fastening as indicated, complying with the following:

.1 Fastening requirements in Part 9 of the National Building Code of Canada.

.2 CCMC or ICC-ES evaluation report for fastener.

.4 Use common steel wire nails unless noted otherwise.

.1 Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials.

.2 Make tight connections.

.3 Install fasteners without splitting wood.

.4 Drive nails snug but do not countersink nail heads unless noted otherwise.

.5 Substitution of common nails with power-driven nails of the same length and diameter is acceptable. Substitution of power-driven nails of smaller diameter is permitted only with the Contract Administrator’s approval.

.1 Set nail gun pressure so that nail heads do not crush plywood surface.

.2 Nail head penetration shall not exceed 2mm.

.6 For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

.1 Comply with approved fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.

.2 Use finishing nails unless noted otherwise. Countersink nail heads and fill holes with wood filler.

.7 Secure floor and roof sheathing with longer edge perpendicular to framing members and with end joints staggered and sheet ends over bearing. For sheathing over solid wood panels, locate sheathing joints away from gaps between panels.

.8 Fully engage tongue and groove edges where applicable. Where sheathing is not tongue and groove, use sheathing clips between sheets.

.9 Secure wall sheathing to wall studs, with ends over firm bearing and staggered. Long dimension of sheathing may be parallel or perpendicular to wall studs.

.10 Coordinate wall, parapet, and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

.11 Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the work day when rain is forecast.

3.3 Quality Control

.1 Provide a system of quality control to ensure that the minimum standards specified in the Contract Documents are attained.

.2 Bring to the attention of the Contract Administrator any defects in the Work or departures from the Contract Documents which may occur during Construction. The Contract Administrator will decide upon corrective action and give recommendations in writing.

.3 The Contract Administrator's general review during construction are both undertaken to inform the City of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve the Contractor of its contractual responsibilities with respect to quality control.

3.4 Notification

.1 Prior to commencing significant segments of the Work, give the Contract Administrator appropriate notification so as to afford them reasonable opportunity to review the Work. Failure to meet this requirement may be cause for the Contract Administrator to classify the Work as defective.

3.5 Defective Materials And Work

.1 Where evidence exists that defective Work has occurred or that Work has been carried out incorporating defective materials, the Contract Administrator may have tests, inspections or surveys performed, analytical calculations of structural strength made and the like in order to help determine whether the Work must be replaced. Tests, inspections or surveys or calculations carried out under these circumstances will be made at the Contractor's expense, regardless of their results, which may be such that, in the Contract Administrator's opinion, the Work may be acceptable.

.2 All testing shall be conducted in accordance with the requirements of the Building Code, except where this would, in the Contract Administrator's opinion, cause undue delay or give results not representative of the rejected material in place. In this case, the tests shall be conducted in accordance with the standards given by the Contract Administrator.

.3 Materials or Work which fail to meet specified requirements may be rejected by the Contract Administrator whenever found at any time prior to the Total Performance of the Work regardless of previous inspection. If rejected, defective materials or Work shall be promptly removed and replaced or repaired to the satisfaction of the Contract Administrator, at no expense to the City.

END OF SECTION

PART 1 – GENERAL

1.1 Definitions

.1 Contract Administrator:
The Contract Administrator is the person or entity engaged by the City and identified as such in the Contract. The Contract Administrator is the Architect, the Engineer, or the entity licensed to practice in the province or territory of the Place of Work. The term Contract Administrator means the Contract Administrator or the Contract Administrator's authorized representative.

.2 Contract Documents:
Drawings, Specifications, and all other documents and amendments which form part of the Contract.

.3 Contractor:
The term Contractor means the Contractor or the Contractor's authorized representative as designated to the City in writing. The term Contractor is defined to include any of the following: Construction Manager, General Contractor, Subcontractor, or Supplier.

.4 City:
The City is the person or entity identified as such in the Contract. The term City means the City or the City's authorized agent or representative as designated to the Contractor in writing but does not include the Contract Administrator.

1.2 Work Included

.1 Comply with Division 01 – General Requirements and all documents referred to therein.

.2 Section includes framing with structural composite lumber:

.1 Laminated Strand Lumber (LSL)

.2 Laminated Veneer Lumber (LVL)

.3 Parallel Strand Lumber (PSL)

.3 Provide all labour and materials to complete the Work indicated in the Contract Documents and specified in this Section.

1.3 Related Work Specified Elsewhere

.1 Section 05 12 00 "Structural Steel Framing" for custom steel connection brackets.

.2 Section 06 10 00 "Rough Carpentry" for dimension lumber framing.

.3 Section 06 16 00 "Sheathing" for floor and roof sheathing.

1.4 Reference Standards, Codes, and Acts

.1 Conform to the requirements of the local building code identified on the structural Drawings as amended by all subsequent regulations issued to the date of this Specification and applicable acts of authorities having jurisdiction.

.2 All references to the standards and publications noted in this Specification shall be to the edition referenced in the local building code identified on the structural Drawings, or to the edition referenced in the latest published editions or revisions of all standards published by the Canadian Standards Association issued to the date of this Specification, whichever is the later edition or revision.

.3 All references to the standards and publications noted in this Specification which are not referenced by the local building code or by the standards published by the Canadian Standards Association shall be to the latest edition and revision published to the date of this Specification.

.4 Standards referenced by the publications noted in this Specification apply even if they are not included in the list. Where such reference is made, it shall be to the latest edition and revision published.

.5 Where there are differences between the Contract Documents and the standards, codes, or acts, the most stringent provisions govern.

.6 References:

.1 ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.2 ASTM A307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.

.3 ASTM A563 Standard Specification for Carbon and Alloy Steel Nuts.

.4 ASTM D2559 Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions.

.5 ASTM D5456 Standard Specification for Evaluation of Structural Composite Lumber Products.

.6 ASTM F1667 Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.7 CSA O86 Engineering Design in Wood.

.8 CSA O112.9 Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).

1.5 Performance Requirements

.1 Engage a qualified professional engineer, licensed at the place where the Project is located, to design connections specified on the Drawings.

.2 Structural Performance:

.1 Design connections to withstand forces specified on the Drawings, within limits and under conditions indicated.

.2 Design all column-to-beam and column-to-girder connections for a horizontal stability force in all directions equal to 2% of the design column axial load acting simultaneously with all other loads.

.3 Design Standard: Comply with CSA O86.

1.6 Submittals for Review

.1 Product Data: For each type of product.

.1 Include data on lumber, adhesives, fabrication, and protection.

.2 For connectors, include installation instructions.

.2 Shop Drawings: Showing fabrication and erection of structural composite lumber.

.1 Show layout of structural composite lumber and full dimensions of each member.

.2 Clearly indicate stress grade.

.3 Include details of cuts, holes, fastenings, and connection hardware.

.3 Provide letter outlining steps to be taken during construction to ensure adequate weather protection of wood structures.

.4 Delegated Design Submittal: For connections indicated to comply with performance requirements. Include sealed shop drawings and design calculations prepared by a qualified professional engineer.

1.7 Submittals for Information

.1 Evaluation Reports: For the following, from CCMC or ICC-ES:

.1 Structural composite lumber.

.2 Power-driven fasteners.

.3 Post-installed anchors.

.4 Metal framing anchors.

.2 Qualification Data: For manufacturer and installer.

1.8 Quality Assurance

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this Section with minimum three years of experience and qualified by a certified agency in accordance with ASTM D5456.

.2 Installer Qualifications: Company specializing in performing the Work of this Section with minimum three years documented experience and approved by the manufacturer.

.3 The Professional Engineer sealing the fabricator’s shop drawings is also responsible for all field review associated with that Work. The Engineer shall provide signed and sealed letters of assurance to the Contract Administrator confirming the Work has been completed in accordance with the final reviewed shop drawings and all structural requirements.

1.9 Delivery, Storage, and Protection

.1 Individually wrap members using plastic-coated paper covering with water-resistant seams.

.1 Keep wrapping on members until permanent protection from the weather is in place, but slit underside to prevent accumulation of moisture inside the wrapping.

.2 Do not deface members when slitting wrap.

.2 Store members off the ground with spacer blocks so air may circulate around all faces of members.

.3 Take particular care to protect exposed end grain.

PART 2 – PRODUCTS

2.1 Structural Composite Lumber

.1 Provide products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for the Project.

.1 Design values, as published by manufacturer, shall meet or exceed those indicated.

.2 Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

.3 Factory mark each piece of structural composite lumber with stamp indicating grade, manufacturer’s name, plant number, third-party certification, and code evaluation agencies.

.2 Source Limitations: Obtain each type of structural composite lumber from single source from a single manufacturer.

.3 Laminated Strand Lumber (LSL): Structural composite lumber made from wood strand elements with grain parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559 or CSA O112.9.

.1 Extreme Fiber Stress in Bending (Limit States Design): 29.6 MPa (4,295 psi) for 305mm (12 in) depth.

.2 Modulus of Elasticity: 10,600 MPa (1,550,000 psi).

.3 All members are to be free of finger joints, scarfs, or mechanical connections in full-length members.

.4 Laminated Veneer Lumber (LVL): Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559 or CSA O112.9.

.1 Extreme Fiber Stress in Bending (Limit States Design): 33.1 MPa (4,805 psi) for 305mm (12 in) depth.

.2 Modulus of Elasticity: 13,700 MPa (2,000,000 psi).

.3 Moisture content shall be between 7% and 16%.

.5 Parallel Strand Lumber (PSL): Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559 or CSA O112.9.

.1 Extreme Fiber Stress in Bending, Beam Orientation (Limit States Design): 36.9 MPa (5,360 psi) for 305mm (12 in) depth.

.2 Extreme Fiber Stress in Compression Parallel to Grain, Column Orientation (Limit States Design): 27.5 MPa (3,990 psi).

.3 Modulus of Elasticity, Beam Orientation: 13,700 MPa (2,000,000 psi).

.4 Modulus of Elasticity, Column Orientation: 12,400 MPa (1,800,000 psi).

.5 Moisture content shall be between 7% and 16%.

2.2 Fasteners

.1 Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Where steel fasteners are indicated, provide fasteners with hot-dip zinc coating complying with ASTM A153 or of Type 304 stainless steel.

.2 Nails, Spikes, and Staples: ASTM F1667.

.3 Power-Driven Fasteners: Fasteners with a CCMC or ICC-ES evaluation report acceptable to authorities having jurisdiction.

.4 Timber Rivets and Steel Side Plates: CSA O86.

.5 Through Bolts and Anchor Bolts: ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers, hot dip galvanized to ASTM A153.

.6 Screws, Tight-Fit Pins and Bolts, Through-Bolts, Glued-In Rods, and Specialty Connectors: As specified on the Drawings.

.7 Light-Gauge Metal Framing Connectors: Galvanized Simpson Strong-Tie connectors or approved equivalent where required.

.8 Structural Steel Connectors: As specified in Section 05 12 00 “Structural Steel Framing.”

.1 All steel and connectors shall be hot dip galvanized unless noted otherwise.

.2 Fabricate steel hardware and connections with joints neatly fitted, welded, and ground smooth.

.3 Test fit in shop.

.9 Post-Installed Anchors: Fastener systems with a CCMC or ICC-ES evaluation report acceptable to authorities having jurisdiction.

2.3 Miscellaneous Materials

.1 Moisture Barrier: Any of the following:

.1 Light gauge metal.

.2 Asphalt-impregnated building paper.

.3 Closed-cell foam gasket material, 6mm thick

.4 Saturated felt roll roofing.

.5 Polyethylene, 6 mil thick.

.2 Proprietary Products:

.1 Proprietary products shown on the Drawings have been selected and specified based on the manufacturer's representation.

.2 The Contract Administrator shall not become guarantor of the product.

.3 Install proprietary products in strict conformance with the manufacturer's recommendations.

.4 Contractor is responsible for proper workmanship during installation.

2.4 Fabrication

.1 Shop fabricate for connections to greatest extent possible, including cutting to length and predrilling fastener holes. Fabricate steel hardware and connections with joints neatly fitted, welded, and ground smooth.

.2 Do not splice or join members in locations other than those indicated without permission.

.3 Fasten multi-ply members in accordance with the manufacturer's recommendations.

.4 Mark members for identification during erection.

PART 3 – EXECUTION

3.1 Examination

.1 Examine supporting construction in areas to receive structural composite lumber, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of the Work.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

.1 Provide temporary shores, guys, braces, and other supports during erection to keep wood framing secure, plumb, and in alignment against wind loads, seismic loads, temporary construction loads, and loads equal in intensity to design loads.

.1 Any failure to make proper and adequate provisions for stresses during erection shall be solely the responsibility of the Installer.

.2 Fasteners required for erection purposes are the responsibility of the Contractor and are to be included in the bid.

.2 Set structural composite to required levels and lines, with members true to line, cut and fitted. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.

.3 Coordinate placement of sheathing and decking with Work of this Section.

.4 Install connectors as indicated.

.1 Install bolts with same orientation within each connection and in similar connections.

.2 Follow manufacturer’s written instructions for fastening multiple members into built-up sections.

.5 Provide moisture barrier at all locations where structural composite lumber abuts concrete or masonry construction.

.6 Repair damaged members after completing erection. Replace damaged members if repairs are not approved by Contract Administrator.

.7 Site cutting or boring of structural composite lumber, other than shown on shop drawings, is not permitted without written consent of Contract Administrator.

.8 After erection, touch up galvanized and primed steel surfaces.

3.3 Erection Tolerances

.1 Columns:

.1 Plumbness: 0.25% of column height (1:400) maximum deviation from plumb.

.2 Position: plus or minus 10mm from theoretical at base in both directions.

.2 Beams:

.1 Elevation: plus or minus 10mm from theoretical.

.2 Position: plus or minus 10mm from theoretical.

3.4 Quality Control

.1 Provide a system of quality control to ensure that the minimum standards specified in the Contract Documents are attained.

.2 Bring to the attention of the Contract Administrator any defects in the Work or departures from the Contract Documents which may occur during Construction. The Contract Administrator will decide upon corrective action and give recommendations in writing.

.3 The Contract Administrator's general review during construction are both undertaken to inform the City of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve the Contractor of its contractual responsibilities with respect to quality control.

3.5 Notification

.1 Prior to commencing significant segments of the Work, give the Contract Administrator appropriate notification so as to afford them reasonable opportunity to review the Work. Failure to meet this requirement may be cause for the Contract Administrator to classify the Work as defective.

3.6 Defective Materials And Work

.1 Where evidence exists that defective Work has occurred or that Work has been carried out incorporating defective materials, the Contract Administrator may have tests, inspections or surveys performed, analytical calculations of structural strength made and the like in order to help determine whether the Work must be replaced. Tests, inspections or surveys or calculations carried out under these circumstances will be made at the Contractor's expense, regardless of their results, which may be such that, in the Contract Administrator's opinion, the Work may be acceptable.

.2 All testing shall be conducted in accordance with the requirements of the Building Code, except where this would, in the Contract Administrator's opinion, cause undue delay or give results not representative of the rejected material in place. In this case, the tests shall be conducted in accordance with the standards given by the Contract Administrator.

.3 Materials or Work which fail to meet specified requirements may be rejected by the Contract Administrator whenever found at any time prior to the Total Performance of the Work regardless of previous inspection. If rejected, defective materials or Work shall be promptly removed and replaced or repaired to the satisfaction of the Contract Administrator, at no expense to the City.

END OF SECTION

PART 1 – GENERAL

1.1 Definitions

.1 Contract Administrator:
The Contract Administrator is the person or entity engaged by the City and identified as such in the Contract. The Contract Administrator is the Architect, the Engineer, or the entity licensed to practice in the province or territory of the Place of Work. The term Contract Administrator means the Contract Administrator or the Contract Administrator's authorized representative.

.2 Contract Documents:
Drawings, Specifications, and all other documents and amendments which form part of the Contract.

.3 Contractor:
The term Contractor means the Contractor or the Contractor's authorized representative as designated to the City in writing. The term Contractor is defined to include any of the following: Construction Manager, General Contractor, Subcontractor, or Supplier.

.4 City:
The City is the person or entity identified as such in the Contract. The term City means the City or the City's authorized agent or representative as designated to the Contractor in writing but does not include the Contract Administrator.

1.2 Work Included

.1 Comply with Division 01 – General Requirements and all documents referred to therein.

.2 Section includes wood chord and plywood or particleboard web joists for floor and roof framing.

.3 Provide all labour and materials to complete the Work indicated in the Contract Documents and specified in this Section.

1.3 Related Work Specified Elsewhere

.1 Section 06 10 00 "Rough Carpentry" for dimension lumber framing.

.2 Section 06 16 00 "Sheathing" for floor and roof sheathing.

.3 Section 06 17 29 "Structural Composite Lumber."

1.4 Reference Standards, Codes, and Acts

.1 Conform to the requirements of the local building code identified on the structural Drawings as amended by all subsequent regulations issued to the date of this Specification and applicable acts of authorities having jurisdiction.

.2 All references to the standards and publications noted in this Specification shall be to the edition referenced in the local building code identified on the structural Drawings, or to the edition referenced in the latest published editions or revisions of all standards published by the Canadian Standards Association issued to the date of this Specification, whichever is the later edition or revision.

.3 All references to the standards and publications noted in this Specification which are not referenced by the local building code or by the standards published by the Canadian Standards Association shall be to the latest edition and revision published to the date of this Specification.

.4 Standards referenced by the publications noted in this Specification apply even if they are not included in the list. Where such reference is made, it shall be to the latest edition and revision published.

.5 Where there are differences between the Contract Documents and the standards, codes, or acts, the most stringent provisions govern.

.6 References:

.1 ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.2 ASTM A307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.

.3 ASTM A563 Standard Specification for Carbon and Alloy Steel Nuts.

.4 ASTM D5055 Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.

.5 ASTM F1667 Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.6 CSA O86 Engineering Design in Wood.

.7 CSA O121 Douglas Fir Plywood.

.8 CSA O325 Construction Sheathing.

1.5 Performance Requirements

.1 Engage a qualified professional engineer, licensed at the place where the Project is located, to design joists and connections.

.2 Structural Performance:

.1 Design joists and connections to resist loads specified on the Drawings.

.2 Limit joist deflection under live load to span/360. At roof deck over areas which do not have suspended ceilings, limit joist deflection under live load to span/240.

.3 Provide a minimum floor performance score of 45 according to Weyerhaeuser's iLevel® Trus Joist® TJ-Pro™ Ratings, or equivalent alternative rating system.

.4 Space members not to exceed 400mm.

.3 Design Standard: Comply with CSA O86.

1.6 Submittals for Review

.1 Product Data: For each type of product.

.1 Include data on joist configurations, bearing and anchor details, bridging, and bracing.

.2 For connectors, include installation instructions.

.2 Shop Drawings: Showing fabrication and erection of joists.

.1 Include data on grades and species of material.

.2 Indicate loads, sizes and spacing of joists, cuts, holes, fastener description and spacings, and bracing.

.3 Indicate all framing and connections required to frame openings.

.3 Provide letter outlining steps to be taken during construction to ensure adequate weather protection of wood structures.

.4 Delegated Design Submittal: For joists and connections indicated to comply with performance requirements. Include sealed shop drawings and design calculations prepared by a qualified professional engineer.

1.7 Submittals for Information

.1 Evaluation Reports: For the following, from CCMC or ICC-ES:

.1 Joists.

.2 Power-driven fasteners.

.3 Post-installed anchors.

.4 Metal framing anchors.

.2 Qualification Data: For manufacturer and installer.

1.8 Quality Assurance

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this Section with minimum three years of experience and qualified by a certified agency in accordance with ASTM D5055.

.2 Installer Qualifications: Company specializing in performing the Work of this Section with minimum three years documented experience and approved by the manufacturer.

.3 The Professional Engineer sealing the fabricator’s shop drawings is also responsible for all field review associated with that Work. The Engineer shall provide signed and sealed letters of assurance to the Contract Administrator confirming the Work has been completed in accordance with the final reviewed shop drawings and all structural requirements.

1.9 Delivery, Storage, and Protection

.1 Transport and store joists in accordance with manufacturer’s written instructions.

.2 Protect joists from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 – PRODUCTS

2.1 Wood I-Joists

.1 Provide products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for the Project.

.1 Design values, as published by manufacturer, shall meet or exceed those indicated.

.2 Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

.3 Factory mark each joist with stamp indicating nominal joist depth, joist class, span ratings, manufacturer’s name, plant number, third-party certification, and code evaluation agencies.

.2 Source Limitations: Obtain joists from single source from a single manufacturer.

.3 Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Comply with material requirements of and with structural capacities established and monitored according to ASTM D5055.

.1 Web Material: Either OSB complying with CSA O325 or plywood complying with CSA O121, exterior grade.

.2 Structural Properties: Depths and design values as specified on the Drawings.

2.2 Fasteners

.1 Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Where steel fasteners are indicated, provide fasteners with hot-dip zinc coating complying with ASTM A153 or of Type 304 stainless steel.

.2 Nails, Spikes, and Staples: ASTM F1667.

.3 Power-Driven Fasteners: Fasteners with a CCMC or ICC-ES evaluation report acceptable to authorities having jurisdiction.

.4 Through Bolts and Anchor Bolts: ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers, hot dip galvanized to ASTM A153.

.5 Screws, Tight-Fit Pins and Bolts, Through-Bolts, Glued-In Rods, and Specialty Connectors: As specified on the Drawings.

.6 Light-Gauge Metal Framing Connectors: Galvanized Simpson Strong-Tie connectors or approved equivalent where required.

.7 Post-Installed Anchors: Fastener systems with a CCMC or ICC-ES evaluation report acceptable to authorities having jurisdiction.

2.3 Miscellaneous Materials

.1 Joist Bridging: Type, size and spacing recommended by joist manufacturer.

.2 Moisture Barrier: Any of the following:

.1 Light gauge metal.

.2 Asphalt-impregnated building paper.

.3 Closed-cell foam gasket material, 6mm thick

.4 Saturated felt roll roofing.

.5 Polyethylene, 6 mil thick.

.3 Proprietary Products:

.1 Proprietary products shown on the Drawings have been selected and specified based on the manufacturer's representation.

.2 The Contract Administrator shall not become guarantor of the product.

.3 Install proprietary products in strict conformance with the manufacturer's recommendations.

.4 Contractor is responsible for proper workmanship during installation.

2.4 Fabrication

.1 Shop fabricate to the greatest extent possible, including cutting to length.

.2 Do not splice or join members in locations other than those indicated without permission.

PART 3 – EXECUTION

3.1 Examination

.1 Examine supporting construction in areas to receive joists, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of the Work.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

.1 Provide temporary shores, guys, braces, and other supports during erection to keep wood framing secure, plumb, and in alignment against wind loads, seismic loads, temporary construction loads, and loads equal in intensity to design loads.

.1 Any failure to make proper and adequate provisions for stresses during erection shall be solely the responsibility of the Installer.

.2 Fasteners required for erection purposes are the responsibility of the Contractor and are to be included in the bid.

.2 Set joists to required levels and lines, with members true to line, cut and fitted. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.

.3 Coordinate placement of sheathing and decking with Work of this Section.

.4 Install connectors as indicated.

.5 Provide moisture barrier at all locations where joists abut concrete or masonry construction.

.6 Repair damaged joists after completing erection. Replace damaged joists if repairs are not approved by Contract Administrator.

.7 Site cutting or boring of joists, other than shown on shop drawings, is not permitted without written consent of Contract Administrator.

3.3 Erection Tolerances

.1 Overall Surface Levelness (Floors and Flat Roofs): 6mm in 3 meters maximum measured at any two points.

.2 Individual Joist Levelness (Floors and Flat Roofs): 6mm in 3 meters maximum.

.3 Elevation: plus or minus 10mm from theoretical.

.4 Joist Spacing: plus or minus 16mm from specified.

3.4 Quality Control

.1 Provide a system of quality control to ensure that the minimum standards specified in the Contract Documents are attained.

.2 Bring to the attention of the Contract Administrator any defects in the Work or departures from the Contract Documents which may occur during Construction. The Contract Administrator will decide upon corrective action and give recommendations in writing.

.3 The Contract Administrator's general review during construction are both undertaken to inform the City of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve the Contractor of its contractual responsibilities with respect to quality control.

3.5 Notification

.1 Prior to commencing significant segments of the Work, give the Contract Administrator appropriate notification so as to afford them reasonable opportunity to review the Work. Failure to meet this requirement may be cause for the Contract Administrator to classify the Work as defective.

3.6 Defective Materials And Work

.1 Where evidence exists that defective Work has occurred or that Work has been carried out incorporating defective materials, the Contract Administrator may have tests, inspections or surveys performed, analytical calculations of structural strength made and the like in order to help determine whether the Work must be replaced. Tests, inspections or surveys or calculations carried out under these circumstances will be made at the Contractor's expense, regardless of their results, which may be such that, in the Contract Administrator's opinion, the Work may be acceptable.

.2 All testing shall be conducted in accordance with the requirements of the Building Code, except where this would, in the Contract Administrator's opinion, cause undue delay or give results not representative of the rejected material in place. In this case, the tests shall be conducted in accordance with the standards given by the Contract Administrator.

.3 Materials or Work which fail to meet specified requirements may be rejected by the Contract Administrator whenever found at any time prior to the Total Performance of the Work regardless of previous inspection. If rejected, defective materials or Work shall be promptly removed and replaced or repaired to the satisfaction of the Contract Administrator, at no expense to the City.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Work of this section includes architectural woodwork as set-out in the Architectural Millwork Schedule including, but not limited to, the following:

.1 Cabinetry and hardware.

.2 Solid surfacing fabrications.

.3 Plastic laminate fabrications.

.4 Closet rod and shelves.

.5 Benches.

.6 Cubbies.

.7 Window sills.

.8 Partial height wall caps.

.9 Vanities

.10 Lockers.

.11 Built-in millwork.

.12 Wood frames and jambs.

.13 Factory and site finishing of architectural woodwork.

1.2 Administrative Requirements

.1 Coordination:

.1 Coordinate with other work for satisfactory and expeditious completion of the work of this section. Coordinate with partition accessories, electrical, communications, audio-visual, and finish components to ensure that proper provisions are made for the installation of the work of this section and for work by others.

.2 Where woodwork is to be fitted to other construction, check actual dimension of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delays in the Work.

.3 Provide forms, templates, anchors, sleeves, inserts and accessories required to be fixed to or inserted in the work of this section and set in place. Instruct applicable Subcontractors as to their locations.

.4 Provide cut-outs for raceways, sleeves, grommets and other manufactured accessories which are required for the work of this section and for work by others.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data for each type of Material and process proposed for use in the work of this section and incorporated into items of architectural woodwork.

.3 Shop drawings:

.1 Submit shop drawings for the work of this section complying with the North American Architectural Woodwork Standards 4.0 requirements.

.2 Shop drawings for the following shall be engineered shop drawings:

.1 Metal support framing assemblies.

.2 Wall hung or suspended millwork.

.3 Ceiling assemblies.

.3 Indicate quality standards and grades.

.4 Include full scale drawings of exposed-to-view edge conditions.

.5 Include plans, sections and large scale details, and indicate components and methods of assembly, fastenings, and other fabrication information required for the work of this section. Indicate assembly joint lines.

.6 Include materials and their characteristics and finishes as applicable including the following:

.1 Panel core and material types, thicknesses, compliance with specified standards, special treatments.

.2 Adhesive types to be used and locations.

.3 Finishing requirements including North American Architectural Woodwork Standards 4.0 finish system number, sheen, and required application steps.

.7 Submit coordination drawings indicating locations of concealed grounds, cut-outs, plates, and other required fabrications.

.8 Show relation to adjoining construction, details of outside and inside corners and door openings.

.9 Provide flame spread ratings of walls and ceiling finishes to meet building code requirements, tested and listed by accredited listing agency.

.4 Selection samples:

.1 Submit 3 sets of samples for initial selection purposes of actual veneers showing full range of grain variation, colour and matching, sheen, natural characteristics reflecting wood cut and species, manufacturing characteristics, and for each wood species specified. Submit samples as many times as required until approved by Contract Administrator. First submission to include one set of samples per Contract Administrator request plus one set lighter in tone and one set darker in tone.

.1 Solid wood with factory finish, and each type of edge trim: set of 3 pieces, 50 mm x 19 mm x 450 mm (2" x 3/4" x 18"), for each colour and finish and installed condition, finished on one side.

.2 Veneered panels, with each type of edge trim with factory finish: 3 finished samples, minimum 450 mm x 450 mm (18" x 18") or larger size for each finish and installed condition, four piece matched veneer cut and colour as specified to fully illustrate natural characteristics, manufacturing characteristics, colour and matching, and special characteristics.

.2 Casework hardware, one unit of each type and finish.

.5 Verification samples:

.1 Submit samples for purpose of verification of compliance with specified requirements.

.2 Submit 3 sets of 200 mm x 200 mm (8” x 8”) samples, or 200 mm (8”) long as applicable, of each specified Material, material and finish, including but not limited to the following:

.1 Shop finished materials, showing each type of finish and colour.

.2 Samples of each specified Material, in each specified colour and finish.

.3 Solid surfacing, in each specified colour and finish.

.4 Plastic laminates, in each specified colour and finish.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit maintenance and cleaning instructions for finishes requiring specific care, noting particularly those procedures or materials which will cause damage to finished surfaces to be included in maintenance manuals.

.3 Maintenance materials:

.1 Deliver extra sets of hardware items for maintenance as follows:

.1 1% of each type actually installed, but not less than 5 sets.

1.5 Quality Assurance

.1 Qualifications:

.1 Manufacturers:

.1 Architectural woodwork shall be manufactured by a firm having 5 years’ experience, minimum, on work of similar size and quality.

.2 Shall be a member in good standing of the Architectural Woodwork Institute or the Architectural Woodwork Manufacturers Association of Canada or the Woodwork Institute.

.3 Solid surfacing fabricator: Fabrication to be performed by a solid surface manufacturer's certified fabricator. Submit certification letter prepared by the solid surfacing manufacturer.

.2 Installers:

.1 Has successfully completed 2 architectural woodwork projects similar in scope, materials and design to this project within the last 5 years.

.2 Quality standard:

.1 Work shall be in accordance with the North American Architectural Woodwork Standards 4.0, Premium Grade, or the highest grade available for performance and appearance characteristics of materials in Sections 3 – 5 used that apply to Material fabrication and installation requirements governed by Sections 6 – 12.

.3 Requirements of regulatory agencies: the work of this section that functions to resist forces imposed by dead and live loads shall conform to requirements of jurisdictional authorities.

.4 Mock-ups:

.1 Refer to mock-ups schedule and as indicated.

1.6 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of this section.

.2 Protect architectural woodwork during transit, delivery, storage and handling to prevent damage, spoilage, and deterioration.

.3 Do not deliver woodwork until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate architectural woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified under paragraph Site Conditions paragraphs of Section 06 40 00.

.4 The architectural woodwork manufacturer and the Contractor shall be jointly responsible to make certain that architectural woodwork is not delivered until the building and storage areas are sufficiently dry so that the architectural woodwork will not be damaged by changes in moisture content.

1.7 Site Conditions

.1 During storage and installation: Obtain and comply with North American Architectural Woodwork Standards 4.0 for optimum temperature and relative humidity conditions for woodwork during its storage and installation. Do not install woodwork until these conditions have been attained. Woodwork shall be acclimatized for a minimum of 72 hours prior to commencing woodwork installation.

.2 During finishing: Comply with Architectural Woodwork Standard’s temperature and humidity requirements before, during, and after application of finishes.

.3 During service life of woodwork: Obtain and comply with woodwork manufacturer's advice for optimum temperature and humidity conditions.

1.8 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

PART 2 - PRODUCTS

2.1 Sustainable Design Requirements

.1 Wood products used in work of this section shall be Forestry Stewardship Council (FSC) Certified, with chain of custody verification, except for products made with recycled material.

.2 Wood-based materials are to contain no added urea-formaldehyde.

2.2 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.3 Performance/Design Requirements

.1 Single-source manufacturing and installation responsibility: Engage a qualified Subcontractor to assume undivided responsibility for woodwork specified in this section, including fabrication, finishing, and installation.

.2 Casework integrity shall meet the minimum acceptance levels in accordance with SEFA 8-1999 as outlined in the North American Architectural Woodwork Standards 4.0 and additional or greater loading capacities as specified throughout the North American Architectural Woodwork Standards 4.0.

.3 Maximum allowable adjustable shelf lengths shall comply with shelves assembly rules per the North American Architectural Woodwork Standards 4.0 based on shelf thickness indicated or scheduled.

2.4 Wood Materials

.1 Lumber:

.1 Hardwood for concealed blocking and framing: Custom grade, any species that, when painted, will not show any defects.

.2 Hardwood for exposed blocking: species and grade to match panel veneer.

.3 Moisture content: Provide kiln-dried (KD) lumber with moisture content range between 6% to 12% for interior architectural woodwork. Maintain temperature and relative humidity during fabrication, storage and finishing operations so that moisture content values for woodwork at time of installation do not exceed 5% to 10%.

.4 Solid hardwood for transparent finish.

.1 Species:

.1 White oak.

.2 Cut:

.1 Benches: Rift.

.2 Handrails: Milled.

.2 Wood veneers:

.1 Allowable wood veneer face grade characteristics shall comply with North American Architectural Woodwork Standards 4.0 referenced grade and referenced standards.

.2 Hardwood veneer; for transparent finish:

.1 Species:

.1 WV01: White Oak.

.2 Veneer thickness: Less than 1.00 mm (0.039") thick after sanding.

.3 Veneer cut:

.1 Rift.

.4 Veneer leaf matching:

.1 Slip.

.5 Veneer assembly matching:

.1 Balance and Centre.

.6 Veneer end matching:

.1 Architectural.

.3 Edgebanding:

.1 Solid wood edge banding: Unless otherwise indicated, exposed panel edges shall be finished with 6 mm (1/4") thick solid hardwood.

2.5 Panel Materials

.1 Panel material schedule; except where indicated otherwise:

.1 Thickness: 19 mm (3/4") minimum.

.2 Core panels:

.1 At veneered work: MDF, except at shelving use veneer core plywood.

.2 At plastic laminate work: MDF.

.3 Plywood backing; countertops, backsplashes, and where indicated: Exterior grade plywood with no added urea-formaldehyde used in composition.

.4 Plywood backing; solid surface countertops.

.3 Maximum moisture content at time of installation: 10% to 12%.

.2 Plywood:

.1 Veneer core plywood non telegraphing grain: Sanded good one side or good two sides (when both sides exposed or to receive applied finish materials) plywood:

.1 Hardwood plywood: in accordance with ANSI/HPVA HP-1-2009.

.2 Softwood plywood: to US Plywood Standard APA PS-1-19 Structural Plywood (with Typical APA Trademarks).

.2 Baltic Birch; exposed and semi-exposed: Birch facers and core veneers, type 2 hot press glue bond (E-1 rating meets European low formaldehyde emission standard), European Face Grade B - Premium grade on exposed faces (patch free clear faces, uniform white in colour), premium edge quality where cut to expose, free of gaps and defects.

.3 Softwood plywood (CSP): in accordance with CSA O151-17.

.4 Fire rated plywood shall be pressure impregnated with fire-retardant chemicals in accordance with CAN/CSA O80 and have Flame Spread Value (FSV) of not more than 25 in accordance with CAN/ULC-S102-10.

.3 Medium density fibreboard (MDF):

.1 To ANSI A208.2-2022, 16mm (5/8”) minimum thickness, 720 kg/m^3 (45 lbs/ft^3) minimum density and as follows:

.1 Grade: Grade 130.

.2 Formaldehyde emission: F21 for panel thicknesses greater than 8 mm (5/16") and F13 for panels equal to or thinner than 8 mm (5/16"). No added urea-formaldehyde used in composition.

.3 FSC certified and 100% recycled wood fibre.

.2 Fire retardant medium density fibreboard (MDF) shall comply with the following requirements in addition to the above requirements:

.1 No Ammonium Polyphosphate used in composition.

.2 Maximum values in accordance with CAN/ULC-S102-10:

.1 Flame Spread Value (FSV): Maximum 25.

.2 Smoke Developed Value (SDV): Maximum 50.

2.6 Plastic and Composite Materials

.1 Low pressure decorative laminate; melamine panels:

.1 Thermally fused laminate (TFL):

.1 19 mm (3/4") minimum thickness MDF with thermally fused melamine resin impregnated decorative paper facing to ANSI/NEMA LD 3-2005, complete with matching non-yellowing edge trim, unless otherwise noted.

.2 Colours: to later selection by Contract Administrator.

.2 High pressure decorative laminate (PLAM):

.1 General purpose grade: in accordance with ANSI/NEMA LD 3-2005, Horizontal General Purpose Grade (HGS).

.2 Colours, finishes, and patterns: Refer to Material Schedule, allow for 9 colours, finishes and patterns.

.3 Solid surfacing sheet (SS1):

.1 Homogenous (not coated, laminated or composite construction), filled material containing methyl methacrylate.

.1 Acceptable Materials:

.1 Dupont 'Corian'.

.2 Formica ‘Everform Solid Surface’.

.3 Wilsonart ‘Solid Surface’.

.2 Thickness: Refer to Material Schedule.

.3 Colour/pattern: Refer to Material Schedule.

.4 Substitutions: in accordance with Section 01 25 00.

.2 Accessories:

.1 Joint adhesive: Manufacturer's standard adhesive to create inconspicuous, nonporous joints, with a chemical bond.

.2 Sealant: Mildew resistant sealant in accordance with Section 07 92 00.

.3 Sink/bowl mounting hardware: Manufacturer's approved bowl clips, brass inserts and fasteners for attachment of undermount sinks/bowls.

2.7 Fasteners and Adhesives

.1 Fasteners shall comply with North American Architectural Woodwork Standards 4.0.

.2 Adhesives: Shall be used for intended purpose and manufacturer materials applications and installation, applied in accordance with manufacturer’s written requirements and shall comply with the “adhesive usage guidelines” recommendations of North American Architectural Woodwork Standards 4.0.

2.8 Hardware

.1 Casework hardware; to be furnished and installed by the architectural woodwork manufacturer.

.1 Where casework hardware is not specified or indicated on drawings or scheduled, casework hardware shall comply with ANSI/BHMA Standards, latest edition, minimum grades, loading and other basic rules per the North American Architectural Woodwork Standards 4.0.

.2 Acceptable manufacturers / Materials:

.1 Drawer slides: 40 kg capacity.

.1 Up to 150 mm deep: Blum ‘BLUMOTION’ full extension with undermount slides or alternative by Mepla.

.2 Over 150 mm deep: by Knape & Vogt or Accuride.

.2 Hinges: soft closing, Euro style full overlay hinges; 110 degrees. Blum ‘Clip Top BLUMOTION 73B359180’ complete with Blum 'Inserta' mounting plate ‘174E710180’.

.3 Pulls; doors and drawers, except where otherwise indicated: 100 mm centre to centre, brushed nickel finish. Richelieu ‘BP515195’.

.4 Locks:

.1 Drawers: Richelieu ‘Olympus Deadbolt Drawer Lock 7/8"’.

.2 Cabinet doors: solid brass tumbler key turn 90 degrees, cylinder 22mm. Richelieu ‘Deadbolt Door Cabinet Lock 7/8" OL107810126D’.

.1 Provide lock at each cabinet door unless otherwise indicated.

.5 Grommets: 75 mm overall dimension, stainless steel. Richelieu ‘20694170’.

.6 Adjustable shelf standards and supports: 5 mm shelf supports, nickel plated steel. Hafele ‘282.04.711’.

.7 Closet rods: Richelieu ‘Sturdy Round Chrome Rod’ with prefabricated radiused corners where indicated.

.8 Casters: total height as indicated. Provide two casters with brake for each storage unit.

.9 Waste / recycling pull out drawer, 2 x 15 L capacity: Richelieu ‘3666100’.

.10 Coat hook: Richelieu ‘T5611140’.

.11 Bench support bracket: Richelieu ‘40121290’.

.12 Card and label holder: Richelieu ‘701143’.

.13 Substitutions: in accordance with Section 01 25 00.

2.9 Finishes - Interior Architectural Woodwork

.1 General: The entire finish of interior architectural woodwork is specified in this section, regardless of whether factory applied or applied after installation.

.2 Preparations for finishing:

.1 Prior to finishing, exposed portions of woodwork shall have handling marks or effects of exposure to moisture removed with a thorough final sanding over surfaces of the exposed portions, using appropriate grit sandpaper, and shall be cleaned prior to applying sealer or finish. Sanding shall be completed just prior to stain or finishing application.

.2 Concealed surfaces of woodwork that might be exposed to moisture, such as those adjacent to exterior concrete or masonry walls, shall be back-primed.

.3 Comply with referenced quality standard in Part 1 for sanding, filling countersunk fasteners, sealing concealed surfaces and similar preparations for finishing of architectural woodwork, as applicable to each unit of work.

.3 Finish for veneer and solid wood:

.1 Comply with requirements indicated below for finish system, staining, and sheen.

.1 Sheen: Flat. Sheen range measurements in accordance with North American Architectural Woodwork Standards 4.0.

.2 Factory finish with transparent, Post Catalyzed Lacquer in accordance with the North American Architectural Woodwork Standards 4.0, Section 5.

.1 Transparent finish:

.1 Clear (natural).

2.10 Fabrication

.1 Fabricate woodwork to dimensions, profiles, and details indicated with openings and mortises pre-cut, where possible, to receive hardware and other items of work.

.2 Complete fabrication, assembly, finishing, hardware application, and other work before shipment to maximum extent possible. Trial fit in shop and disassemble components only as necessary for shipment and installation. Where necessary, provide ample allowance for scribing, trimming, and fitting. Reassemble with concealed fasteners.

.3 Provide woodwork, solid tops and other indicated materials with pre-cut openings, where possible, for hardware, appliances, plumbing fixtures, electrical work, telephone cut-outs and similar items. Locate openings accurately and provide proper size and shape. Smooth edges of cut-outs and, where located in countertops, seal edges of cut-outs with a water-resistant coating.

.4 Provide framing for architectural woodwork, complete with bracing and fastening devices as required for a rigid installation, and as required to sustain the imposed loads.

.5 Reinforcing shown is minimum. Provide additional reinforcing as required to ensure a rigid assembly. Take responsibility for the stability of furniture and fitments.

.6 Provide balancing sheets as required, and specified, complying with the North American Architectural Woodwork Standards 4.0.

.7 Provide surface mount blocking and strapping necessary to support the work of this section. Such blocking shall not be exposed upon completion of work.

.8 Prefinish work at the factory, except where specified or indicated otherwise.

.9 Panel construction; solid wood edgebanded.

.10 Solid wood edging: No end grain shall be visible; mitre external corners; house internal corners.

2.11 Fabrication - Solid Surfacing

.1 Fabricate components in shop to greatest extent practical to size and shape indicated, in accordance with reviewed shop drawings and manufacturer's written requirements.

.2 Form joints between components using manufacturer's standard joint adhesive. Joints shall be inconspicuous in appearance and without voids. Attach 100 mm (4") wide solid surfacing material reinforcing strip under joints.

.3 Provide holes and cut-outs as indicated or as required.

.4 Rout and finish component edges to a smooth, uniform finish. Rout cut-outs then sand edges smooth. Repair or reject defective or inaccurate work.

.5 Surfaces shall have a uniform finish.

.6 Thermoforming: Comply with thermoforming data from manufacturer.

.1 Construct matching molds to form component shapes.

.2 Form pieces to shape prior to seaming and joining.

.3 Cut pieces larger than finished dimensions, sand edges, remove nicks and scratches.

.4 Heat entire component uniformly during forming.

.5 Prevent blistering, whitening or cracking of solid surfacing material during forming.

PART 3 - EXECUTION

3.1 Preparation

.1 Condition woodwork to field conditions in installation areas before installing. Ensure that field conditions have been provided as requested and specified.

.2 Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including back priming and removal of packing.

.3 Provide grounds, nailers and other required fabrications which are to be built into other work when required.

.4 Ensure that wall and ceiling variations are not in excess of 6.4 mm (1/4") in 3658 mm (144") and that floors are not in excess of 12.7 mm (1/2") in 3658 mm (144") of being plumb, level, flat, straight, square, of the correct size. Variations shall be corrected prior to installation of work of this section.

.5 Report conditions contrary to requirements preventing proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

3.2 Installation

.1 Install woodwork to comply with North American Architectural Woodwork Standards 4.0 for same grade specified in Part 1 of this section for type of woodwork involved.

.2 Install woodwork plumb, level, true, and straight with no distortions.

.3 Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.

.4 Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fastener heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork and matching final finish where transparent finish is indicated.

.5 Complete the finishing work specified in this section to whatever extent not completed at shop or before installation of woodwork.

3.3 Installation - Tolerances

.1 Install to a tolerance of 3 mm in 2400 mm (1/8" in 8’-0") for plumb and level (including tops) and with no variations in flushness of adjoining surfaces unless otherwise acceptable in accordance with the North American Architectural Woodwork Standards 4.0.

3.4 Adjusting and Cleaning

.1 Repair damaged and defective woodwork where possible to eliminate defects functionally and visually; where not possible to repair, replace woodwork.

.2 Clean, lubricate, and adjust hardware.

.3 Clean woodwork on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.5 Protection

.1 Protect architectural woodwork during remainder of construction period to ensure that work will be without damage or deterioration at time of acceptance.

.2 Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, that ensure that woodwork is without damage or deterioration at time of Substantial Performance.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Composite plank benches.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.2 Submit manufacturers' installation instructions.

.3 Shop drawings:

.1 Submit elevations, sections and details of assembly components; indicate locations, configurations, large scale plans.

.2 Show connection to substrate, rough-in and anchor placement dimensions and tolerances and clearances required.

.3 Show location of members, other items of work and related work of other Sections to be coordinated with the series.

.4 Submit detail drawings depicting installation techniques.

.4 Samples:

.1 Submit sample of composite fabrications. Samples shall fully represent materials to be supplied in colour, texture, finish and construction.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Maintenance data:

.1 Submit manufacturer's maintenance instructions for inclusion in the operation and maintenance manuals.

1.5 Quality Assurance

.1 Qualifications:

.1 Subcontractor:

.1 Has adequate plant, equipment and skilled workers to perform the work expeditiously.

.2 Has successfully completed installations similar to that specified during a period of at least the immediate past 5 years.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 Composite planks:

.1 Recycled plastic lumber made of high-density polyethylene base resins.

.2 Plank size: 25.4 mm x 140 mm (1" x 5-1/2").

.3 Edge profile: Square.

.4 Basis of design:

.1 Trex Composite Decking 'Lineage Collection'.

.2 Subject to compliance with the requirements of the *Contract Documents*, systems from the following manufacturers may be considered as alternatives to the system specified if proposed substitution is submitted in accordance with Section 01 25 00:

.1 Tangent 'Dimensional Lumber'.

.2 Substitutions: in accordance with Section 01 25 00.

.5 Finish: manufacturer's proprietary ultraviolet (UV) stabilized paint system.

.1 Colours: to later selection by Contract Administrator from the Transcend Lineage product line.

2.3 Accessories

.1 Fasteners: Anchors and fasteners shall be Type 304 stainless steel where exposed and hot dip galvanized steel where unexposed.

.2 Sealant: in accordance with Section 07 92 00.

2.4 Fabrication Tolerances

.1 Comply with the following maximum tolerances:

.1 Level: 3.2 mm in 3 m (1/8" in 10'-0"); 6.4 mm in 12.2 m (1/4" in 40'-0").

.2 Where surfaces abut in line, limit offset from true alignment to 1.5 mm (1/16").

.3 Square or rectangular: Maximum 3.2 mm (1/8") in 3 m (10'-0").

PART 3 - EXECUTION

3.1 Preparation

.1 Take site measurements to ensure that work of this section is fabricated to fit structure; surrounding construction; around obstructions and projections in place, or as shown on drawings; and to suit locations of services.

.2 Verify that backup construction is aligned for proper installation of work of this section before commencing erection.

.1 Substrates and substructure shall be installed straight and true within 3.2 mm (1/8") in 2440 mm (8'-0").

.3 Notify Contract Administrator in writing of conditions detrimental to proper and timely completion of work. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.2 Installation

.1 Install composite fabrications in accordance with manufacturer's written requirements and reviewed shop drawings.

.2 Anchor composite fabrications securely per engineering recommendations and in accordance with reviewed shop drawings to allow for necessary thermal movement and structural support.

.3 Provide temporary supports or bracing as required to maintain position, stability and alignment of parts until permanently secured.

.4 Provide joint spacing between parts as detailed in the reviewed drawings for expansion and the application of joint treatment materials.

.5 Conceal fasteners.

.6 Seal between work of this section and work of other sections to meet specified requirements of Section 07 92 00 and to achieve a watertight installation.

3.3 Installation Tolerances

.1 Comply with the following maximum tolerances:

.1 Level: 3.2 mm in 3 m (1/8” in 10’-0”); 6.4 mm in 12.2 m (1/4” in 40’-0”).

.2 Where surfaces abut in line, limit offset from true alignment to 1.5 mm (1/16").

.3 Square or rectangular: Maximum 3.2 mm (1/8") in 3 m (10’-0").

3.4 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

3.5 Adjusting and Cleaning

.1 Remove damaged, dented, defaced, defectively finished, or tool marked components and replace with new.

.2 Wash down exposed surfaces using solution of mild domestic detergent in warm water, applied with soft clean wiping cloths.

END OF SECTION

PART 1 – GENERAL

1.1 SECTION INCLUDES

.1 This section includes all labour and materials required to complete mock-up installation including component review and testing and quality control/quality assurance testing on thermal and moisture protection systems.

1.2 RELATED SECTIONS

.1 Section 04 05 00 – Masonry Procedures

.2 Section 04 05 13 – Mortar and Grout for Masonry

.3 Section 04 05 19 – Masonry Reinforcement and Connectors

.4 Section 04 05 23 – Masonry Accessories

.5 Section 04 22 23 – Architectural Concrete Masonry Units

.6 Section 07 11 13 – Bituminous Dampproofing

.7 Section 07 13 26 – Self-Adhering Sheet Waterproofing

.8 Section 07 13 54 – Modified Bituminous Sheet Waterproofing

.9 Section 07 16 16 – Surface Applied Crystalline Waterproofing

.10 Section 07 21 00 – Thermal Insulation

.11 Section 07 21 10 – Below Grade Perimeter Insulation

.12 Section 07 26 16 – Below Grade Vapour Barrier

.13 Section 07 27 00 – Air Barrier Systems

.14 Section 07 46 16 – Aluminum Composite Panel Cladding System

.15 Section 07 46 19 – Metal Cladding Systems

.16 Section 07 52 16 – Modified Bituminous Membrane Roofing

.17 Section 07 62 00 – Metal Flashing

.18 Section 07 72 33 – Roof Hatches

.19 Section 07 92 00 – Joint Sealants

.20 Section 07 95 13 – Expansion Joint Cover Assemblies

1.3 MEASUREMENT AND PAYMENT

.1 No measurement will be made under this section.

.2 Building Envelope Testing; by Building Envelope Commissioning Authority, on behalf of The City.

.3 Co-ordinate visual review and testing frequency and locations with Building Envelope Commissioning Authority to facilitate review of multiple distinct building envelope elements and components during the same visit.

.4 Costs incurred for additional testing for items not meeting the specifications including costs for transportation and for required modifications to be the responsibility of the Contractor.

1.4 REFERENCES

.1 American Society for Testing and Materials (ASTM):

.1 ASTM C1521-19(2020) Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.

.2 ASTM D4541-17 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

.3 ASTM D7954/D7954M-15A (R21) Standard Practice for Moisture Surveying of Roofing and Waterproofing Systems Using Nondestructive Electrical Impedance Scanners

.4 ASTM E1186-17 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.

1.5 PRE-CONSTRUCTION CONFERENCE

.1 Pre-Installation Conference in accordance with General Requirements.

.2 Convene pre-installation conference minimum five (5) working days prior to beginning site installation of mock-up.

.3 Establish date, time and location of conference and notify parties concerned minimum five (5) working days before conference.

.4 Contractor, Contract Administrator, Commissioning Authority, Building Envelope Commissioning Authority, and installers involved in work to be in attendance.

.5 Agenda for conference:

.1 Confirm lines of communication and Building Envelope Commissioning Team contacts.

.2 Verify project requirements, design, and intent of design.

.3 Review installation and substrate conditions.

.4 Co-ordinate with subtrades.

.5 Review manufacturer’s installation instructions and warranty requirements.

.6 Review compatibility of materials.

1.6 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 Submittal Procedures.

.2 Submit test results from testing agency for each specified test maximum one week following completion of testing.

.3 The manufacturer for each component of the building envelope, including but not necessarily limited to all thermal and moisture protection components, shall provide written verification that the proposed material and systems will meet or exceed the requirements of the Contract Documents.

.4 Product Data

.1 Provide product data for:

.1 Section 04 05 00 – Masonry Procedures

.2 Section 04 05 13 – Mortar and Grout for Masonry
.3 Section 04 05 19 – Masonry Reinforcement and Connectors
.4 Section 04 05 23 – Masonry Accessories
.5 Section 04 22 23 – Architectural Concrete Masonry Units
.6 Section 07 11 13 – Bituminous Dampproofing
.7 Section 07 13 26 – Self-Adhering Sheet Waterproofing
.8 Section 07 13 54 – Modified Bituminous Sheet Waterproofing
.9 Section 07 16 16 – Surface Applied Crystalline Waterproofing
.10 Section 07 21 00 – Thermal Insulation
.11 Section 07 21 10 – Below Grade Perimeter Insulation
.12 Section 07 26 16 – Below Grade Vapour Barrier
.13 Section 07 27 00 – Air Barrier Systems
.14 Section 07 46 16 – Aluminum Composite Panel Cladding System
.15 Section 07 46 19 – Metal Cladding Systems
.16 Section 07 52 16 – Modified Bituminous Membrane Roofing
.17 Section 07 62 00 – Metal Flashing
.18 Section 07 72 33 – Roof Hatches
.19 Section 07 92 00 – Joint Sealants
.20 Section 07 95 13 – Expansion Joint Cover Assemblies

.5 Shop Drawings

.1 Provide shop drawings for:

.1 Section 04 05 19 – Masonry Reinforcement and Connectors
.2 Section 04 05 23 – Masonry Accessories
.3 Section 04 22 23 – Architectural Concrete Masonry Units
.4 Section 07 46 16 – Aluminum Composite Panel Cladding System
.5 Section 07 46 19 – Metal Cladding Systems
.6 Section 07 52 16 – Modified Bituminous Membrane Roofing
.7 Section 07 62 00 – Metal Flashing
.8 Section 07 72 33 – Roof Hatches

1.7 QUALITY ASSURANCE

.1 Notify the Contract Administrator, Commissioning Authority, Building Envelope Commissioning Authority, and the Testing Agency in writing of the construction and testing schedule prior to the start of work.

.1 On-site testing and reporting of the Contractor's work shall be carried out by the by the Building Envelope Commissioning Authority.

.2 Field review/Testing frequency:

.1 On-Site Mock-Up Review and/or testing of thermal and moisture protection components:

.2 Review the mock-ups at completion milestones. Unless otherwise noted, mock-ups to be the first installation of the thermal and moisture protection components.

.3 Provide a minimum seventy-two (72) hours' notice for thermal and moisture protection components to be reviewed by Building Envelope Commissioning Authority.

.3 On-Site Quality Assurance Review and/or Testing

.1 Visual review and testing of the installed thermal and moisture protection components may be periodically completed at the discretion of the Building Envelope Commissioning Authority.

.2 Provide a minimum seventy-two (72) hours' notice for thermal and moisture protection components to be reviewed by Building Envelope Commissioning Authority.

PART 2- PRODUCTS

2.1 Not Used.

PART 3- EXECUTION

3.1 MASONRY

.1 Provide mock-ups of masonry at locations identified by the Building Envelope Commissioning Authority prior to full system installation. Mock-ups to be provided for each combination of masonry and substrate.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.2 SELF-ADHERING SHEET WATERPROOFING

.1 Provide a mock-up of self-adhered sheet waterproofing at a location identified by the Building Envelope Commissioning Authority prior to full system installation.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.3 MODIFIED BITUMINOUS SHEET WATERPROOFING

.1 Provide a mock-up of modified bituminous sheet waterproofing at a location identified by the Building Envelope Commissioning Authority prior to full system installation.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

.3 Adhesion testing:

.1 Adhesion testing shall be completed by the Building Envelope Commissioning Authority in accordance with ASTM D4541, using a 2.25” diameter disk.

.2 Standard of acceptance shall be the mean minus one standard deviation calculated from the mock-up and compared to manufacturer’s requirements, but not less than 15 psi. In the event of a deficit, the manufacturer shall be consulted for direction.

.3 Pull tests shall be completed in sets of five per each substrate type, at the discretion of the Building Envelope Commissioning Authority.

.4 Frequency of testing:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

.4 Air- leakage testing:

.1 Air leakage testing shall be completed by the Building Envelope Commissioning Authority at membrane seams and overlaps and at the cladding support system anchorage penetrations in accordance with ASTM E1186.

.2 Standard of acceptance is no observable air leakage.

.3 Frequency of testing:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.4 SURFACE APPLIED CRYSTALLINE WATERPROOFING

.1 Provide a mock-up of the surface applied crystalline waterproofing at a location identified by the Building Envelope Commissioning Authority prior to full system installation.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.5 THERMAL INSULATION

.1 Provide mock-ups of thermal insulation at locations identified by the Building Envelope Commissioning Authority prior to full system installation. Mock-ups to be provided for each type of thermal insulation.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.6 BELOW GRADE PERIMETER INSULATION

.1 Provide mock-ups of below grade perimeter insulation at locations identified by the Building Envelope Commissioning Authority prior to full system installation.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.7 BELOW GRADE VAPOUR BARRIER

.1 Provide mock-ups of below grade vapour barrier at locations identified by the Building Envelope Commissioning Authority prior to full system installation.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.8 AIR BARRIERS

.1 Provide mock-ups of the air barriers at locations identified by the Building Envelope Commissioning Authority prior to full system installation. Mock-ups to be provided for each combination of membrane and substrate.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

.3 Adhesion testing:

.1 Adhesion testing shall be completed by the Building Envelope Commissioning Authority in accordance with ASTM D4541, using a 2.25” diameter disk.

.2 Standard of acceptance shall be the mean minus one standard deviation calculated from the mock-up and compared to manufacturer’s requirements, but not less than 15 psi. In the event of a deficit, the manufacturer shall be consulted for direction.

.3 Pull tests shall be completed in sets of five per each substrate type, at the discretion of the Building Envelope Commissioning Authority.

.4 Frequency of testing:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

.4 Air- leakage testing:

.1 Air leakage testing shall be completed by the Building Envelope Commissioning Authority at membrane seams and overlaps and at the cladding support system anchorage penetrations in accordance with ASTM E1186.

.2 Standard of acceptance is no observable air leakage.

.3 Frequency of testing:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.9 ALUMINUM COMPOSITE PANEL CLADDING SYSTEMS

.1 Provide mock-ups of Aluminum Composite Panel Cladding Systems at locations identified by the Building Envelope Commissioning Authority prior to full system installation.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.10 METAL CLADDING SYSTEMS

.1 Provide mock-ups of Metal Cladding Systems at locations identified by the Building Envelope Commissioning Authority prior to full system installation.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.11 MODIFIED BITUMINOUS MEMBRANE ROOFING

.1 Provide a mock-up of the 2-ply mod bit membrane roofing at a location identified by the Building Envelope Commissioning Authority prior to full system installation.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

.3 Air- leakage testing:

.1 Air leakage testing shall be completed by the Building Envelope Commissioning Authority at vapour barrier membrane seams and overlaps and at penetrations in accordance with ASTM E1186.

.2 Standard of acceptance is no observable air leakage at the penetrations.

.3 Frequency of testing:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

.4 Electrical impedance scanning:

.1 Electrical impedance scanning shall be completed by the Building Envelope Commissioning Authority in accordance with ASTM D7954.

.2 Frequency of testing:

.1 Once upon Substantial Completion of the Work at the Discretion of the City and Building Envelope Commissioning Authority.

3.12 ROOF HATCHES

.1 Provide mock-ups of Roof Hatches at locations identified by the Building Envelope Commissioning Authority prior to full system installation.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.13 JOINT SEALANTS

.1 Provide mock-ups of Joint Sealants at locations identified by the Building Envelope Commissioning Authority prior to full system installation.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

.3 Adhesion testing:

.1 Adhesion testing on fully cured joints shall be completed by the Building Envelope Commissioning Authority in accordance with ASTM C1521, Destructive Procedure Method A.

.2 Adhesion testing on fully cured joints at dissimilar substrates shall be completed by the Building Envelope Commissioning Authority in accordance with ASTM C1521, Flap Procedure.

.3 Standard of acceptance shall be in accordance with manufacturer's published data and as follows:

.1 Silicone Sealants:

.1 Sealant should tear cohesively within itself or elongate the 1" gauge length the extent specified in the product manufacturer's technical literature before releasing from either substrate adhesively.

.2 Urethane Sealants:

.1 Sealant should tear cohesively within itself without bond loss.

.4 At this time, the joint will be reviewed for complete fill. The joint should not have voids, and joint dimensions should match those shown on the drawings.

.5 Frequency of testing:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.14 EXPANSION JOINT COVER ASSEMBLIES

.1 Provide mock-ups of Expansion Joint Cover Assemblies at locations identified by the Building Envelope Commissioning Authority prior to full system installation.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.15 THERMOGRAPHIC SCAN

.1 Thermographic scan shall be completed by the Building Envelope Commissioning Authority in general accordance with ASTM E1186 prior to Substantial Performance.

.1 Minimum temperature differential shall be 20°C, or as otherwise directed by the Contract Administrator.

.2 Building shall be under positive pressurization to 50 Pa, or as otherwise directed by the Contract Administrator.

.2 Contractor to co-ordinate, supervise, assist, and provide access for thermographic scan including coordination with the City for mechanical system pressurization during the test.

3.16 ANALYSIS AND CORRECTIVE PROCEDURES

.1 Repair all damages from testing.

.2 Remediate non-conforming work identified during visual reviews and testing.

.3 Do not cover any remediated work until reviewed by the Building Envelope Commissioning Authority, or until the Building Envelope Commissioning Authority has reviewed proof of remediation.

.4 Re-testing of remediated work shall be at the discretion of the Building Envelope Commissioning Authority.

.5 Costs for repairs, remediation of non-conforming work, and re-testing are the responsibility of the Contractor. No additional costs to be submitted to The City for repairs or testing.

3.17 REPORTING

.1 Prepare reports in accordance with the specified test methods.

.2 Reports to include modifications and repairs made to the test specimen.

.3 Submit reports withing 5 working days following field observations and testing.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Bituminous sheet waterproofing; torch applied (SWP1).

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.2 Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

.3 Shop drawings:

.1 Show locations and extent of waterproofing and details of penetrations, inside and outside corners, tie-ins with adjoining waterproofing, movement joints, and termination conditions. Include manufacturer’s standard details and provide manufacturer’s custom details/sketches to show conditions of overlap, interface, and penetrations.

.4 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Subcontractor:

.1 Has adequate plant, equipment and skilled workers to perform the work expeditiously.

.2 Has successfully completed installations similar to that specified during a period of at least the immediate past 5 years.

.3 Has been trained and approved by the waterproofing system manufacturer for the installation of their Material.

.2 Mock-Up:

.1 Coordinate with mock-ups specified in Section 07 08 00.

.2 Construct panels 10 m² (100 ft²) of typical waterproofing installation for review and approval of Contract Administrator Locate at the Site as part of final installation including termination at the top of the footing, tie-in to adjacent membranes, penetration detailing, and drainage board.

.3 Do not proceed until mock-up has been reviewed and accepted by Contract Administrator.

1.5 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of Section 07 13 54.

.2 Do not double-stack pallets during shipping or storage.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 10 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29, 01 74 19, 01 81 19, and 01 33 29, as applicable.

.2 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.3 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Installed waterproofing system shall provide watertight protection to prevent the passage of water under hydrostatic pressure.

.2 Single source responsibility:

.1 Provide Materials from one waterproofing system manufacturer for the work of this section, including accessory Materials and materials.

.1 Where waterproofing system manufacturer does not manufacture or supply required accessory Materials and materials, any such accessory Materials or materials supplied for use in the Work shall have approval from waterproofing system manufacturer for use as part of the final warrantied installation.

2.3 Bituminous Sheet Waterproofing - Torch Applied

.1 Bituminous sheet waterproofing system (SWP1): Composed of a non-woven polyester reinforcement and SBS modified bitumen. Both faces covered with thermofusible plastic film.

.1 Thickness: 3.0 mm (0.120").

.2 Acceptable Materials:

.1 Soprema ‘Colphene Flam 180’.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Primer:

.1 Blend of elastomeric bitumen, volatile solvents and adhesive enhancing additives and enhance adhesion of torch-applied waterproofing membrane.

.2 Acceptable Material:

.1 Soprema ‘Elastocol 500’.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Waterproofing mastic:

.1 Black solvent-based mastic containing SBS modified bitumen, fibres and mineral fillers.

.1 Acceptable Material:

.1 Soprema ‘Sopramastic’.

.2 Substitutions: in accordance with Section 01 25 00.

.4 Drainage mat:

.1 High density drainage panel with non-woven, factory laminated geotextile.

.2 Acceptable Material:

.1 Soprema ‘Sopradrain 15-G’.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Compressive strength: 718 kPa (15,000 psf).

2.4 Expansion Joints

.1 Description:

.1 Manufactured from a proprietary copolymer with internal polyester reinforcement, monolithic seam vulcanization.

.2 Movement and fabrication: Tri-directional movement capability, joint waterproofing system shall be factory fabricated in one piece for the entire contiguous expansion joint or where length of joint exceeds manufacturer's shipping and handling guidelines shall be lapped and vulcanized by manufacturer's mechanics on site, repair of damaged materials shall be performed by manufacturer's mechanics.

.3 Compatible with adhesives and membranes associated with expansion joint construction in accordance with manufacturer's installation requirements.

.4 Warranted by manufacturer to cover full warranty duration specified in this section.

.5 Hydrostatic pressure limit: Working pressure in column of water shall perform under static limit not to exceed 10 m (33ft).

.2 Acceptable Materials; to suit type of assembly and movement design requirements:

.1 Soprema 'Soprajoint Plus'.

.2 Situra Inc.'Flamline' or 'Redline'.

.3 Substitutions: in accordance with Section 01 25 00.

PART 3 - EXECUTION

3.1 Examination

.1 Examine conditions of substrates and other conditions under which the work of this section is to be performed and notify the Contract Administrator, in writing, of circumstances detrimental to the proper completion of the Work. Do not proceed with the work of this section until unsatisfactory conditions are corrected and are acceptable for compliance with manufacturer's warranty requirements.

.2 Comply with membrane manufacturer's Material data, including Material application and installation requirements, as well as membrane manufacturer's shipping and storage recommendations.

3.2 Waterproofing Installation

.1 Install waterproofing in strict accordance with the manufacturer's installation guidelines using accessory products, protection and drainage layers, and in accordance with manufacturer's required standard and project specific details.

.2 Inspect finished waterproofing installation and repair damaged material and obtain acceptance of installation from Contract Administrator, Inspection and testing Contract Administrator and Contractor in writing prior to concrete placement. Prevent displacement of waterproofing system during concrete placement.

3.3 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.2 Field tests and inspections:

.1 Coordinate with inspection and testing as specified in Section 07 08 00.

.2 Upon completion of the work of this section, have entire installation inspected by membrane manufacturer's authorized representative in the presence of Contract Administrator.

.3 Manufacturer’s field review to be in accordance with Section 01 45 00.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Surface applied crystalline waterproofing.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Subcontractor:

.1 Has adequate plant, equipment and skilled workers to perform the work expeditiously.

.2 Has successfully completed installations similar to that specified during a period of at least the immediate past 5 years.

.2 The work of this section shall be executed by an approved applicator of membrane manufacturer. If requested, submit evidence of this approval.

.3 Mock-up:

.1 Coordinate with mock-ups specified in Section 07 08 00.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 5 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29, 01 74 19, 01 81 19, and 01 33 29, as applicable.

.2 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.3 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Installed waterproofing system shall provide watertight protection to prevent the passage of water.

.2 Single source responsibility:

.1 Provide Materials from one waterproofing system manufacturer for the work of this section, including accessory Materials and materials.

.1 Where waterproofing system manufacturer does not manufacture or supply required accessory Materials and materials, any such accessory Materials or materials supplied for use in the Work shall have approval from waterproofing system manufacturer for use as part of the final warrantied installation.

2.3 Materials

.1 System description:

.1 Chemical treatment for the waterproofing and protection of concrete by process of diffusion and crystalline formation and migration throughout the pores and capillary tracts of concrete.

.2 Approved for potable water storage.

.2 Crystalline waterproofing slurry; acceptable Materials:

.1 Gemite 'Cem-Kote CW-Plus'.

.2 Koster 'NB1 Grey'.

.3 Kryton 'Krystol T1'.

.4 Master Builders Solutions Canada 'Masterseal 500'.

.5 Tremco 'Permaquik 200'.

.6 Vandex 'Super/Super White'.

.7 Xypex 'Concentrate'.

.3 Crystalline waterproofing mortar; acceptable Materials:

.1 Gemite ‘Fibre-Patch OV’.

.2 Koster ‘NB Elastic Grey’.

.3 Kryton ‘Repair Grout’.

.4 Master Builders Solutions Canada ’Masterseal 500 Mortar’.

.5 Tremco; mortar as approved by Tremco.

.6 Vandex; mortar: as approved by Vandex.

.7 Xypex ‘Concentrate Dry-Pac’.

.4 Rapid repair and setting mortar: Rapid-setting repair and plugging material: as recommended by waterproofing system manufacturer in accordance with manufacturer’s specifications.

.5 Water: potable.

.6 Waterstops: in accordance with Section 07 17 18.

PART 3 - EXECUTION

3.1 Preparation

.1 Examine concrete surfaces to be waterproofed and repair prior to application of cementitious waterproofing materials.

.2 Remove oil, grease, paint, loose dust, laitance and other deleterious substances from concrete substrate.

.3 Concrete surfaces to receive cementitious waterproofing slurries shall have an open capillary system. Lightly sandblast or water blast extremely smooth surfaces to ensure proper bond with cementitious waterproofing materials and to remove form oil and release agents from concrete surface. Site specific surface preparation procedures to be submitted by manufacturer based on as-built condition.

.4 Form tie holes shall be left approximately one inch from surface. Repair holes as specified.

.5 Remove honeycombed areas and other faulty concrete to a depth where sound concrete is reached and repair in accordance with crystalline waterproofing manufacturer’s written requirements.

.6 Rout out cracks, holes and repair and treat in accordance with crystalline waterproofing manufacturer’s written requirements.

.7 Repair leaking construction joints and cracks, cold joints, and honeycombing, treated prior to installation of crystalline waterproofing in accordance with crystalline waterproofing manufacturer’s written requirements.

.8 Crystalline waterproofing applications applied to concrete over three days old are to be thoroughly washed with water in order that moisture be present in concrete. Do not install crystalline waterproofing to walls that are soaking wet. Allow concrete to dry to at least a damp appearance prior to application of crystalline waterproofing slurry.

3.2 Mixing

.1 Mix thoroughly in accordance with manufacturers written requirements.

3.3 Installation

.1 Apply crystalline waterproofing Materials in accordance with manufacturer's written requirements.

3.4 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.2 Manufacturer’s field review to be in accordance with Section 01 45 00.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Bentonite waterstop.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Manufacturers:

.1 Company specializing in manufacturing the Materials specified in this section, with 10 years' experience, minimum.

.2 Installers:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified and with approval and training of Material manufacturers.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 Manufacturer

.1 Colloid Environmental Technologies Company (CETCO) as distributed by DRE Industries Inc.

.2 Substitutions: in accordance with Section 01 25 00.

2.2 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29, 01 74 19, 01 81 19, and 01 33 29, as applicable.

.2 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.3 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.3 Performance/Design Requirements

.1 Single source responsibility:

.1 Provide Materials from one waterstop manufacturer for the work of this section, including accessory Materials and materials.

.1 Where waterstop manufacturer does not manufacture or supply required accessory Materials and materials, any such accessory Materials or materials supplied for use in the Work shall have approval from waterstop manufacturer for use as part of the final warrantied installation.

2.4 Materials

.1 Waterstop (Waterbars):

.1 Flexible bentonite rubber waterstop that stops water infiltration through cast-in-place concrete construction joints subjected to continuous or intermittent hydrostatic pressure.

.2 Bentonite content: 75% sodium bentonite and 25% butyl rubber compound.

.3 For concrete greater than 200 mm (8") thickness: 'Volclay Waterstop-RX 101'.

.4 For concrete greater than 200 mm (8") thickness and where specifically indicated: 'Volclay Waterstop-RX 101T'.

.5 For concrete less than 200 mm (8") thickness: 'Volclay Waterstop-RX 102'.

.6 Adhesive and primer: low VOC, 100% solids, non-shrinking product with excellent UV resistance, CETCO ‘CETSEAL’, primer as recommended by waterstop manufacturer.

.7 Substitutions: in accordance with Section 01 25 00.

PART 3 - EXECUTION

3.1 Waterstop Installation

.1 Coordinate work of this section with work of other sections to assure proper and adequate provision in work of other sections.

.2 Lay out the work to determine and anticipate conditions prior to start of work of this section. Note termination and penetration conditions to determine methods for creating a waterproof joint.

.3 Surfaces to receive waterstop shall be free of dust, dirt, snow, ice, form release oils and other contaminants.

.4 Do not install waterstop in standing water or on iced surfaces.

.5 Prime surfaces, including concrete, masonry, metal and wood, to properly prepare areas to receive waterstop material.

.6 Prime surfaces using adhesive, by width of waterstop material, along entire surface length. Allow adhesive to dry for 5 - 10 minutes or until black. Allow for longer drying periods in temperatures below 13°C, or in damp conditions.

.7 Install waterstop where indicated and in accordance with waterstop manufacturer's requirements and written specifications.

.8 Remove release paper and firmly press entire length of waterstop material onto adhesive. For overhead and vertical applications, firmly press for minimum of 15 seconds to assure adhesion.

.9 Apply waterstop within 2 hours of adhesive turning black. Areas not receiving waterstop within 6 hours of adhesive turning black should be recoated with adhesive and in accordance with manufacturer’s written specifications.

.10 Verify that waterstop remains in direct contact with substrate along the entire installation.

.11 Install waterstop in applicable vertical and horizontal cast-in-place concrete construction joints; and around applicable penetrations and structural members. Place waterstop to allow for minimum 75 mm (3") concrete coverage on all sides, 50 mm (2") coverage for RX-102.

.12 Tightly butt coil ends together to form a continuous waterstop. Do not overlap coil ends. Place in maximum practicable lengths to minimize coil end joints. Cut strips to fit around penetrations.

.13 Install waterstop around through wall pipes and mechanical penetrations; and around structural steel elements.

.14 Protect installed waterstop from prehydration prior to concrete placement and product encapsulation. Replace waterstop material that exhibit significant expansion prior to concrete encapsulation.

3.2 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.2 Manufacturer's field review to be in accordance with Section 01 45 00.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Waterproof traffic coating systems; FLC1.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Samples:

.1 Submit samples of each specified material, in each specified colour to show successive applications of each coat.

.4 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Maintenance instructions:

.1 Submit maintenance instructions for incorporation into maintenance manuals.

1.5 Quality Assurance

.1 Qualifications:

.1 Execute the work of this section using workers skilled in the respective duties for which they are employed, and with minimum 3 years' experience in application of Materials, systems, and assemblies specified.

.2 Mock-up:

.1 Construct 2 m^2 (20 ft^2) mock-up panel of typical traffic coating system at the Site as part of final installation for review, location to be determined by Contract Administrator.

1.6 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of this section.

.2 Maintain materials at minimum temperature of 15.5°C before use.

1.7 Site Conditions

.1 Concrete substrate conditions:

.1 Concrete shall be clean, sound, compressive strength 20 MPa (2900 psi) minimum, crack free and contain 3% maximum moisture content by mass.

.2 Test for moisture content in accordance with manufacturer's specifications and the following:

.1 Remove concrete chippings, wrap in vapour retardant plastic and deliver immediately to lab.

.2 Test in accordance with ASTM D1864/D1864M-89(2023).

.3 Concrete shall be free from sealers or membrane curing agents or other foreign matter.

.4 Allow concrete to cure 28 days minimum before applying traffic surfacing.

.5 Concrete shall have light steel trowel finish.

.6 Finish surfaces shall be level, or straight where sloped to drains. Variation in plane of substrate shall not exceed 1:500. Deviations or deteriorated concrete shall be repaired prior to start of work of this section.

1.8 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor’s LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor’s LEED coordinator with regard to IAQ management activities.

2.2 Service Room Traffic Coating System - Pedestrian Grade (FLC1)

.1 System description:

.1 In accordance with ASTM C957-17(2024).

.2 High-solids, cold liquid-applied, polyurethane, waterproofing, pedestrian traffic-bearing, seamless, elastomeric waterproofing membrane system.

.1 Primer: Liquid primer recommended for substrate and conditions by traffic-coating manufacturer.

.2 Base coat: Single component aromatic polyurethane.

.3 Top coat: Single component aliphatic polyurethane with manufacturer's standard aggregate of size, shape and hardness as recommended by traffic-coating manufacturer.

.3 System performance requirements:

.1 VOC content: LEED compliant.

.2 Suitable for pedestrian traffic, skid resistant aggregate loaded top surface, and waterproof.

.3 Aggregated slip-resistant surface.

.4 Thickness: 40 mil minimum.

.2 Acceptable Materials:

.1 Tremco 'Vulkem 350NF/351NF System'.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Colour: to later selection by Contract Administrator.

2.3 Auxiliary Materials

.1 Each material used in the application of each flooring and wall system shall be as recommended or manufactured by the supplier of the coating.

.2 Primers, crack and joint fillers, and block wall fillers and other fillers: as recommended by membrane manufacturer.

.3 Sealant: in accordance with waterproofing system manufacturer's written installation requirements.

PART 3 - EXECUTION

3.1 Preparation

.1 Prepare surfaces as required to receive the work of this section. Remove projections and other conditions that may affect the installation of the flooring system.

.2 Concrete slabs shall have sound surface free of dust, chemicals, grease, oil, laitance and curing agents.

.3 Fill open control joints, and other cracks and voids with sealant material compatible with floor coating materials.

.4 Prepare surfaces by mechanical method of steel shotblast, sandblast, or other method approved by coating manufacturer in accordance with International Concrete Repair Institute (ICRI) recommendations to achieve a CSP 3 profile. Thoroughly vacuum clean floors upon completion of blast operation. Substrate shall be approved in writing by manufacturer prior to application of coating.

.5 Submit written report to Contract Administrator following procedures for manufacturer's field review in accordance with Section 01 45 00.

.6 Cover or mask surfaces adjacent to those receiving floor coating to protect work of others and property from damage and soil.

3.2 Installation - Pedestrian Grade

.1 General:

.1 Apply traffic surfacing in accordance with manufacturer's written requirements.

.2 Apply traffic surfacing such that no laps, voids, or other marks or irregularities are visible, and with an appearance of uniform colour, sheen and texture, within limitations of materials and areas concerned.

.3 Make clean true junctions with no visible overlap between adjoining applications of coatings.

.4 Place cloths and other disposable coating materials that are a fire hazard, in closed metal containers and remove from building at the end of each Working Day.

.2 Apply primer followed by traffic surfacing in accordance with manufacturer's written requirements.

.3 Embed waterproofing membrane within drain assembly in accordance with manufacturer's written requirements to provide watertight seal.

.4 Apply top coat to achieve a uniform, slip resistant surface.

.5 Provide sealant bead at tops of bases to create watertight seal.

3.3 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00, and as follows:

.1 Verify by Tooke thickness gauge, and in the presence of Contract Administrator, that thicknesses of complete traffic surfacing is in accordance with the Contract Documents.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Thermal insulation forming part of the building envelope, including:

.1 Batt insulation.

.2 Semi-rigid insulation.

.3 Polyurethane foam (gap filler) insulation.

.2 Section excludes:

.1 Below grade and perimeter insulation: in accordance with Section 07 21 10.

.2 Roof insulation: in accordance with Section 07 52 16.

.3 Insulation within aluminum framed glazing systems: in accordance with Section 08 44 00.

.4 Insulation within louvre blank-off panels: in accordance with Section 08 91 19.

.5 Acoustic insulation within gypsum board assemblies: in accordance with Section 09 29 00.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.2 Submit data and installation instructions for materials and prefabricated devices, providing descriptions sufficient for identification at the Site.

.3 Submit data from manufacturer's or independent laboratory indicating compatibility and adhesive results of proposed materials.

.3 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Subcontractor:

.1 Has adequate plant, equipment and skilled workers to perform the work expeditiously.

.2 Has successfully completed installations similar to that specified during a period of at least the immediate past 5 years.

.2 Mock-ups: Coordinate with mock-ups specified in Section 07 08 00.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Batt Insulation

.1 Unfaced, mineral-fibre batts, in accordance with CAN/ULC S702-14, Type 1.

.2 Acceptable *Products*:

.1 CertainTeed Insulation Canada Inc. 'Fibre Glass Building Insulation'.

.2 Johns Manville 'Unfaced Batts'.

.3 Owens Corning 'PINK NextGen Fiberglas'.

.4 Knauf Insulation 'EcoBatt'.

.5 Rockwool 'ComfortBatt'.

2.3 Semi-Rigid Insulation

.1 Semi-rigid insulation:

.1 Mineral-fibre in accordance with CAN/ULC S702-14, Type 1, either dual density or mono density.

.1 Dual density:

.1 Outer layer: 100 kg/m^3 (6.2 lb/ft^3) in accordance with ASTM C303-21.

.2 Inner layer: 61 kg/m^3 (3.8 lb/ft^3) in accordance with ASTM C303-21.

.2 Provide black mineral fiber facing for open joint cladding locations, perforated facer at perforated cladding panels and where indicated.

.3 Acceptable Materials:

.1 Rockwool 'CavityRock'.

.2 Owens Corning 'Thermafiber Rainbarrier'.

2.4 Polyurethane Foam (Gap Filler) Insulation

.1 Polyurethane foam for thermal insulation around exterior framing assemblies (Gap Filler):

.1 One-component CFC-free polyurethane foam in accordance with CAN/ULC S710.1-19.

.2 Two-component CFC-free polyurethane foam to CAN/ULC S711.1-19.

2.5 Accessories

.1 Insulation fasteners: HDPE washer, zinc plated pin finish, pins purpose made to suit substrate material, 50 mm (2") minimum insulation holding diameter; direct fasten type, pin depth length to suit insulation thickness.

.1 For insulation equal or less than 150 mm (6") thick:

.1 Acceptable Materials:

.1 ITW Construction Products Ramset 'InsulFast'.

.2 For insulation greater than 150 mm (6") and equal or less than 200 mm (8") thick:

.1 Acceptable Materials:

.1 Hilti 'X-IE'.

PART 3- EXECUTION

3.1 Installation - General

.1 Install insulation in accordance with manufacturer's written requirements applicable to products and applications indicated.

.2 Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

.3 Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

.4 Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness. Where multiple layers of insulation boards/batts are required, offset outer layer insulation board/batt joints 150 mm (6") from underlying insulation layer(s).

.5 Install attachment at rate as required to prevent displacement of insulation boards during construction operations.

.6 Form an unbroken thermal envelope:

.1 Insulation boards at joints shall be in contact for the full thickness of the insulation. Maximum acceptable joint width is 3 mm (1/8”). Fill joints larger than 3 mm (1/8”) with insulation or replace to create a tighter joint.

.2 Offset insulation board joints a minimum of 150 mm (6”).

.3 Insulation boards shall be free from chipped or broken edges.

.4 Use largest possible dimensions to reduce number of joints.

.7 Apply insulation to ensure total and complete coverage of surfaces indicated to be insulated, and in direct contact with such surfaces.

.8 Ensure integrity and continuity of insulation at juncture with different types of materials and seal in an acceptable manner.

.9 Do not cover insulation until it has been reviewed and accepted by Contract Administrator.

3.2 Installation - Batt Insulation

.1 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.2 Install batt insulation to fill cavity unless otherwise indicated.

.3 Trim insulation to provide close-fit contact to framing assemblies and fill the required cavity or insulation assemblies to thicknesses specified or indicated.

.4 Do not over compress or pack insulation to fit into spaces; maintain density to be consistent with the density of the uncompressed batt product.

.5 Cut insulation to provide close-fit contact around electrical boxes, pipes, and other obstructions and penetrations through and within assemblies.

.6 Secure insulation in such a manner that it will not sag or settle away from required locations.

.7 At locations where insulation is not sandwiched by sheet metal or board materials, install continuous woven wire restraint mechanically fastened to steel studs to hold insulation against exterior sheathing materials.

.8 Place insulation equal to that indicated for applicable assembly in jamb and header assemblies that will be inaccessible after their installation into wall.

3.3 Installation - Semi-Rigid Insulation

.1 Install at masonry assembly locations in accordance with Section 04 05 00.

.1 Where applicable, fasten insulation using masonry tie securement plates provided under Section 04 05 19.

.2 In locations where insulation clips are not practical or available with masonry connectors, mechanically fastened to substrate with minimum of 5 insulation fasteners per insulation board and maximum spacing of 610 mm (24") on centre.

.3 Position fasteners 75 mm (3”) from insulation board edges.

.2 For cladding assemblies other than masonry assemblies:

.1 Mechanically fasten to substrate with minimum of 5 insulation fasteners (dice pattern) per insulation board and maximum spacing of 610 mm (24") on centre.

.2 Position fasteners 75 mm (3”) from insulation board edges.

3.4 Installation - Foamed-in-Place (Gap Filler) Insulation

.1 Install one-component foam insulation to fill gaps where indicated, in accordance with CAN/ULC S710.2-11 application standard.

.2 Install two-component foam to locations where indicated, in accordance with CAN/ULC S711.2-11 application standard.

3.5 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

3.6 Protection

.1 Comply with manufacturer's written requirements respecting protection.

.2 Repair damage resulting from performance of work of this section in manner acceptable to Contract Administrator.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Below grade insulation at vertical conditions.

.2 Below grade insulation at horizontal and sloped conditions, outboard of grade beam.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.2 Submit data and installation instructions for materials and prefabricated devices, providing descriptions sufficient for identification at the Site.

.3 Submit data from manufacturer's or independent laboratory indicating compatibility and adhesive results of proposed materials.

.3 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Subcontractor:

.1 Has adequate plant, equipment and skilled workers to perform the work expeditiously.

.2 Has successfully completed installations similar to that specified during a period of at least the immediate past 5 years.

.2 Mock-ups: Coordinate with mock-ups specified in Section 07 08 00.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 Rigid insulation board; below grade insulation at vertical locations:

.1 Extruded polystyrene:

.1 Closed-cell, smooth skin, in accordance with CAN/ULC S701.1-17, Type 4, 207 kPa (30 psi) compressive strength.

.2 Acceptable Materials:

.1 DuPont 'Styrofoam SM'.

.2 Owens Corning 'Foamular NGX C-300'.

.3 Soprema 'SOPRA-XPS 30'.

.2 Rigid insulation board; below grade insulation at horizontal and angled locations, below structural slab:

.1 Compressive strength in accordance with ASTM D1621-16(2023), 276 kPa (40 psi) minimum (measured at 5% deformation or at yield, whichever occurs first).

.2 Extruded polystyrene board:

.1 Extruded polystyrene, closed-cell, smooth skin, in accordance with CAN/ULC S701.1-17, Type 4:

.2 Acceptable Materials:

.1 DuPont 'Styrofoam Highload 40'.

.2 Owens Corning 'Foamular NGX 400'.

.3 Soprema 'SOPRA-XPS 40'.

.3 Adhesive for insulation boards: Polymer modified liquid applied membrane, compatible with insulation to be applied, type as manufactured for the attachment of insulation, and as recommended by insulation manufacturer.

PART 3 - EXECUTION

3.1 Installation

.1 Apply insulation to ensure total and complete coverage of surfaces indicated to be insulated, and in direct contact with such surfaces.

.2 Apply adhesives, and install insulation in accordance with manufacturer's printed recommendations. Apply at rate as required to prevent displacement of insulation boards during construction operations.

.3 On vertical surfaces, set insulation units using manufacturer’s recommended adhesive according to manufacturer’s written requirements.

.4 On horizontal surfaces, loosely lay insulation units according to manufacturer's written requirements. Insulation boards at joints shall be in contact for the full thickness of the insulation. Maximum acceptable joint width is 3 mm (1/8”). Fill joints larger than 3 mm (1/8”) with insulation or replace to create a tighter joint. Offset end joints a minimum of 150 mm (6”).

.5 On horizontal surfaces, beneath structural slab, pin to slab on top of voidform.

.6 Do not cover insulation until it has been reviewed and accepted by Contract Administrator.

3.2 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

3.3 Protection

.1 Comply with manufacturer's printed recommendations respecting protection.

.2 Protect polystyrene insulation from extended exposure to sunlight.

.3 Repair damage resulting from performance of work of this section in manner acceptable to Contract Administrator.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Sprayed foam insulation and air barrier system.

.2 Sprayed protective thermal barrier.

1.2 Administrative Requirements

.1 Coordination:

.1 Coordinate the work of this section with sections referencing this section.

.2 Coordinate with related work to allow for installation of required materials prior to spray insulation.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.3 Samples:

.1 Submit samples of all materials proposed for use in the work of this section.

.2 Submit duplicate 305 mm x 350 mm (12" x 12”) samples of sheet membrane material.

.4 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Execute the work of this section using workers skilled in the respective duties for which they are employed, and with minimum 5 years’ experience in application of Materials, systems, and assemblies specified. In addition:

.1 Application of insulation/air barrier system shall be by applicators certified by CUFCA/NECA (Canadian Urethane Foam Contractors Association/National Energy Conservation Association) or certified by the manufacturer of the system being installed for the installation of their system, and have third party independent certification in accordance with the training requirements outlined in CAN/ULC S705.2-05.

.2 Material manufacturer/distributor shall have an on-site quality assurance program. Submit three copies of quality assurance program upon request.

.2 Daily Work Sheets:

.1 Complete Daily Work Sheet as required by CAN/ULC S705.2-05. Submit copy of completed Daily Work Sheets to Contract Administrator if requested.

.3 Mock-ups:

.1 Provide mock-up of spray foam insulation and air barrier materials where directed by Contract Administrator.

.2 Coordinate with mock-ups specified in Section 07 08 00.

1.5 On-Site Documentation

.1 Maintain a copy of the manufacturer's technical manual on site during application of polyurethane foam.

.2 Compile Daily Work Records chronologically and maintain on site during application.

1.6 Occupancy Requirements

.1 Occupancy: In accordance with CAN/ULC-S774, occupancy is only permitted following delivery of minimum 0.3 air changes per hour for 24 hours following installation.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor’s LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Long Term Thermal Resistance LTTR: Tested by an independent laboratory in accordance with CAN/ULC S770-15 and achieving the required values at a minimum core density of 28.34 kg/m^3 (1.77lb/ft^3).

.2 Aged thermal resistance values based on test methods other than LTTR or at densities lower than specified will not be accepted.

.3 LTTR-values shall be based on density not less than minimum insitu density.

.4 Core density shall be confirmed by field testing.

.5 Products of this section shall be:

.1 Listed with Canadian Construction Materials Centre (CCMC) certifying product for use as insulation in accordance with the building code.

2.3 Materials

.1 Sprayed foam insulation and air barrier:

.1 Sprayed polyurethane foam: To CAN/ULC S705.1-18, HFO-based closed cell, spray-applied rigid cellular polyurethane foam, medium density.

.2 Sustainable Requirements:

.1 Low GWP (Global Warming Potential): Utilizing HFO blowing agent, GWP <1.

.2 Eco-efficiency analysis, life cycle assessment approved by an independent third party.

.3 Modify spray foam to suit temperature application in accordance with insulation manufacturer's recommendations.

.4 Burning characteristics; maximum values in accordance with CAN/ULC-S102-10:

.1 Flame spread: 500.

.2 Smoke developed: 500.

.5 Water vapour permeance; with outer skins to simulate actual in-situ conditions:

.1 Maximum 57 ng/Pa.m^2 .s. (1 perm) when tested to ASTM E96/E96M-16.

.6 Acceptable Materials:

.1 BASF Building Systems 'Walltite v.5'.

.2 Carlisle Spray Foam Insulation 'SealTite One'.

.3 Elastochem Specialty Chemicals Inc. 'Insulthane Extreme'.

.4 Huntsman Building Solutions 'Heatlok Soya HFO/Polarfoam SOYA HFO'.

.5 Soprema 'Sopra SPF 200'.

.6 Substitutions: in accordance with Section 01 25 00.

.2 Transition air barrier membrane at substrate transitions and as indicated, at control joints, over parapet wall at roof air barrier locations down onto roof air barrier; and between junctions of dissimilar material prior to the application of the insulation. Install in widths of min. 300 mm (12") with 150 mm (6") cover to each side of joints or onto dissimilar products.

.1 Primers: As required by CAN/ULC S705.2-05, Annex A and to suit environmental conditions at time of application.

.2 Self-adhesive membrane: Composite preformed modified membrane system consisting of SBS modified asphalt for low temperature flexibility and polyethylene scrim reinforcing, with physical properties as follows:

.1 Thickness: 1 mm (40 mils).

.2 Application temperature: minimum +5 °C.

.3 Elongation: 200% minimum in accordance with ASTM D412-16(2021)-modified.

.4 Low temperature flexibility: to -30 °C to CGSB 37-GP-56M-1985.

.5 Air leakage: 0.005 L/m^2.s under a pressure differential of 75 Pa in accordance with ASTM E283-04.

.6 Water vapour transmission: 2.8 ng/Pa.s.m^2 in accordance with ASTM E96/E96M-16.

.3 Acceptable Materials: As approved in writing by sprayed foam insulation manufacturer.

.1 Primer: in accordance with manufacturers written requirements of air barrier sheet membrane being provided in the Work.

.2 Membrane: in accordance with manufacturers written requirements of air barrier sheet membrane being provided in the Work.

.3 Termination mastic: Rubberised asphalt-based mastic with 200 g/l max. VOC content, in accordance with manufacturers written requirements of air barrier sheet membrane being provided in the Work.

.3 Sprayed protective thermal barrier:

.1 Shall meet requirements of Classification B when tested in accordance with CAN/ULC-S124-06.

.4 Accessories:

.1 Concealed sheet metal flashing (cavity firestop where noted):

.1 Prefinished sheet steel: Commercial quality to ASTM A653/A653M-18 with Z275 designation zinc coating.

.2 Minimum thickness: 0.45 mm (0.0179”) (26 gauge).

.3 Finish: Factory prefinished with polyester powder coat or enamel finish.

.2 Fasteners: Galvanized steel screws with anticorrosive coating system and EPDM washers.

2.4 Compatibility

.1 Ensure that materials used are compatible. Obtain confirmation from sprayed foam insulation manufacturer.

.2 Provide written proof of compatibility.

PART 3 - EXECUTION

3.1 Examination

.1 Verify that surfaces and conditions are ready to accept the work of this section. Application of work of this section shall be deemed acceptance of existing work and existing conditions. Report in writing defects in substrate which may adversely affect the performance of the sprayed-applied foamed-in-place air barrier insulation.

.2 Before commencing work, ensure that environmental and site conditions are suitable for installation of materials.

.3 Commencement of work shall imply acceptance of surfaces and conditions.

3.2 Preparation

.1 Surfaces to receive sprayed-applied foamed-in-place air barrier insulation shall be free of frost, loose or foreign matter which might impair adhesion of materials.

.2 Prepare surface by brushing, scrubbing, scraping, or grinding to remove loose mortar, dust, oil, grease, oxidation, millscale and other contaminants which will affect adhesion and integrity of the foam insulation/air barrier system. Wipe down metal surfaces to remove release agents or other non-compatible coatings, using clean sponges or rags soaked in a solvent compatible with the foam insulation. Ensure surfaces are dry before proceeding.

.3 Prepare joints to receive foam air barrier sealant by brushing, scrubbing, wiping, scraping or grinding to remove loose mortar, dust, oil grease, solvents, oxidation, mill scale and other contaminants which will affect adhesion and integrity of foam sealant.

.4 Do not allow sprayed-applied foamed-in-place air barrier insulation to cover or mark adjacent surfaces. Use masking materials if necessary.

3.3 Installation

.1 Apply materials in accordance with material manufacturer's written requirements.

.2 Apply sprayed-applied foamed-in-place air barrier insulation in accordance with CAN/ULC S705.2-05.

.3 Overlap joints of transition air barrier membrane a minimum 100 mm (4"). Seal laps and termination joints with edge of transition air barrier membrane sealer. Transition air barrier membrane shall be installed prior to application of the urethane foam. Transition air barrier membrane shall be installed prior to application of the urethane foam.

.4 Fill joints with sprayed-applied foamed-in-place air barrier insulation making allowances for post expansion of foam.

.5 Finish joints shall be free from air pockets and imbedded foreign materials. Cut back excess foam sealant after cutting flush with surrounding surfaces unless otherwise directed or detailed.

.6 Apply sprayed-applied foamed-in-place air barrier insulation within +6.4 mm (1/4") and -0 mm (0") of indicated thicknesses.

.7 Maximum pass thickness shall be 50 mm (2") per application pass. After spraying a pass, cooling time shall be allowed for the dissipation of heat. Allow a period of at least 10 minutes before applying a second pass. For overall installation thicknesses of greater than 100 mm (4") comply with manufacturer's installation requirements.

.8 Finished sprayed-applied foamed-in-place air barrier insulation shall be free of voids and embedded foreign materials.

.9 Concealed sheet metal flashing:

.1 Install continuous formed sheet metal with fasteners at maximum horizontal and vertical spacing of 450 mm (18") on centre.

3.4 Installation - Sprayed Protective Thermal Barrier

.1 Apply bonding adhesive or primer to substrate in accordance with manufacturer's written installation requirements.

.2 Apply sprayed protective thermal barrier to correspond with tested assemblies, or acceptable calculation procedures to provide following fire resistance ratings for protection of sprayed foam insulation.

.3 Apply sprayed protective thermal barrier over substrate, building up to required thickness to cover substrate with monolithic blanket of uniform density and texture.

3.5 Adjusting and Cleaning

.1 Remove over-spray and masking material immediately after foam has cured to hard surface film.

.2 Clean and make good surfaces soiled or damaged by work of this section. Consult with section of work soiled before cleaning to ensure methods used will not damage their work.

.3 Do not permit adjacent work to damage work of this section. Damage to work of this section caused by other sections shall be made good by this section at the expense of the section which caused the damage.

3.6 Field Quality Control - General

.1 Conduct quality control in accordance with Section 01 45 00.

.1 Inspection and testing:

.1 Insulation/air barrier applications: Arrange for one site review by manufacturer's authorized agent.

3.7 Field Quality Control - Air Barrier System Testing Requirements

.1 Conduct adhesion tests daily in accordance with CAN/ULC S705.2-05. Record test results in Daily Reports.

.2 Adhesion testing:

.1 Conduct adhesion testing between the transition membranes and substrates for compliance in accordance with the manufacturer's guidelines for use in an air barrier application.

.2 Conduct adhesion testing between the polyurethane foam and transition membranes, and substrates for compliance in accordance with the manufacturer's guidelines for use of SPF in an air barrier application, and to CAN/ULC S705.2-05.

.3 Report non-compliant test results along with corrective action taken to the Contract Administrator and manufacturer and include in daily report.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Below-grade vapour barrier; located beneath concrete slabs.

.2 Crawl space ground vapour barrier.

.3 Walkway precast concrete pavers.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials to be for used in the work of this section.

.3 Shop drawings:

.1 Submit drawings showing locations of joints, details of system, including penetration conditions, and other fabrication information in accordance with Section 01 33 00.

.4 Manufacturer's instructions:

.1 Submit manufacturer's Material installation instruction for Materials to be used in the work of this section.

.5 Vapour barrier test results and certification:

.1 Provide certification prepared by accredited testing company for test procedures listed in Table 1 of ASTM E1745-17(2023) and paragraphs 7.1.2, 7.1.3, 7.1.4, and 7.1.5 of ASTM E1745-17(2023). Provide the date of the most recent test and the test results for each test.

.1 Accompany certification tests specified above with letter signed by Material manufacturer attesting that material to be provided is of the same formulation and manufacture as the Material tested.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 5 years' experience, minimum, in application of Materials.

.2 Mock-up:

.1 Coordinate with mock-ups specified in Section 07 08 00.

.2 Construct 10 m² (100 ft²) area of typical installation for each type of Material.

.1 Construct mock-up of sheet vapour barrier installation including one lap joint, one edge termination/transition, and one penetration. Mock-up may be part of finished work.

.3 Locate at the Site as part of final installation.

.4 Do not proceed until mock-up has been reviewed by Contract Administrator.

.5 When accepted, mock-up will demonstrate minimum standard of quality required for this work.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 Vapour barrier membrane:

.1 Performance criteria:

.1 Permeance, as tested after conditioning: not greater than 0.5700 ng/(Pa*s *m²)(0.010 perms (gm/ft²/in-Hg)) in accordance with ASTM E1745-17(2023) paragraphs 7.1.2 through 7.1.5.

.2 Strength: Class A to ASTM E1745-17(2023).

.3 Thickness of plastic:

.1 Minimum 0.38 mm (15 mils).

.2 Acceptable Materials:

.1 Stego Industries 'Stego Wrap Vapor Barrier', thickness specified above.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Crawl space ground vapour barrier:

.1 Performance criteria:

.1 Permeance, as tested after conditioning: not greater than 0.5700 ng/(Pa*s *m²)(0.010 perms (gm/ft²/in-Hg)) in accordance with ASTM E1745-17(2023) paragraphs 7.1.2 through 7.1.5.

.2 Strength: Class A to ASTM E1745-17(2023).

.3 Thickness of plastic:

.1 Minimum 0.38 mm (15 mils).

.2 Acceptable Materials:

.1 Stego Industries ‘StegoCrawl Wrap Vapor Barrier’, thickness specified above.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Vapour barrier membrane joint tape:

.1 Pressure sensitive high density polyethylene tape, product selection per vapour barrier membrane manufacturer’s written installation requirements.

.2 Width:

.1 All locations except as noted below: 100 mm (4") wide.

.2 Areas with void forms: 150 mm (6") wide.

.1 Acceptable Materials:

.1 Stego Industries ‘Stego Crete Crawl Tape’.

.4 Penetration flashing:

.1 Vapour barrier membrane material and vapour barrier joint tape in accordance with manufacturer’s written requirements.

.5 Walkway precast concrete pavers: uniform in material, colour, size and from one manufacturer, to the following:

.1 In accordance with CSA A231.1-19/A231.2-19.

.2 Units shall be sound and free of defects that would interfere with the proper placing of the unit or impair the strength and permanence of the construction.

.3 Thickness: as indicated.

PART 3 - EXECUTION

3.1 Installation

.1 Install vapour barrier membrane in accordance with below-grade vapour barrier manufacturer’s written requirements and ASTM E1643-24.

.2 Extend vapour barrier to the perimeter of the slab and seal to perimeter and penetration conditions. Seal around penetrations such as utilities and columns per manufacturer's recommendations in order to create a monolithic membrane. At below grade conditions, provide continuous coverage from underside of concrete slab to underside of pile caps and grade beams.

.3 Install vapour barrier membrane using largest practicable sheet size to minimize joints over compacted fill.

.4 Inspect vapour barrier membrane sheets for continuity. Repair punctures and tears in vapour barrier membrane with sealing tape before work is concealed.

.5 Vapour barrier membrane installation shall be continuous and vapour tight.

.6 Overlap vapour barrier membrane joints 150 mm (6") minimum and tape seal with vapour barrier joint tape.

.7 For underslab vapour barrier, unroll vapour barrier membrane with longest dimension parallel with direction of concrete placement.

.8 Lap vapour barrier membrane up foundation walls a minimum of 100 mm (4") and tape seal with vapour barrier joint tape.

.9 Centre vapour barrier joint tape over vapour barrier membrane laps and joints. Keep area of tape adhesion free of dust, dirt, and moisture.

.10 Cut slit around pipes, ductwork, rebar, and wire penetrations to place the initial layer of vapour barrier membrane.

.1 Cut a piece of vapour barrier membrane minimum width of 300 mm (12"). The length should be 1 1/2 times the pipe circumference. With a roofer's knife or scissors, cut "fingers" half the width of the film.

.2 Wrap vapour barrier membrane around and tape the collar onto the pipe and completely tape fingers to the bottom layer of vapour barrier membrane with vapour barrier joint tape.

.11 In the event that vapour barrier membrane is damaged during or after installation, repair the membrane. Cut a piece of vapour barrier membrane large enough to cover damage by minimum overlap of 150 mm (6"). Clean adhesion areas of dust, dirt, and moisture. Tape down edges using vapour barrier joint tape.

3.2 Concrete Paving Units

.1 Remove from Site, pavers with excessive chips, cracks, voids, discolourations or other defects.

.2 Lay pavers in the approved patterns.

.3 Maintain consistent jointing of between 3 mm (1/8") and 4 mm (0.158").

.4 String lines on bedding course to hold patterns true.

.5 Fill gaps at edge of paving surface with standard edge pavers or with pavers cut to fit. Cutting shall be accomplished to leave a clean edge to traffic surface, using a mechanical hydraulic or guillotine cutter or a masonry saw.

.6 The use of infill concrete or discontinuities in pattern will not be permitted except along outer pavement boundaries adjacent to drains, manholes and edge restraints and where circles or part circles meet straight lines.

.7 Sweep clean areas after cutting of debris to facilitate inspection and to ensure pavers are not damaged during completion.

.8 Inspect paved area after sweeping and prior to compaction to ensure satisfactory colour blending. Move pavers to provide good colour distribution.

.9 Install edge units plumb with top flush with unit paving surface.

3.3 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.2 Manufacturer's field review to be in accordance with Section 01 45 00.

.1 Review installation of areas with void forms.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Sheet-applied self-adhesive vapour impermeable air barrier membrane.

.2 Sheet-applied self-adhesive vapour permeable air barrier membrane.

.3 Sheet metal air and vapour barrier.

.2 Section excludes:

.1 High temperature grade membrane: in accordance with Section 07 62 00.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Compatibility statement:

.1 Submit manufacturer's compatibility statement validating compatibility of air barrier system materials with substrates and adjacent materials.

.4 Samples:

.1 Submit 305 mm (12") square samples of each type of air barrier membrane.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Installers: Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

.2 Mock-up:

.1 Coordinate with mock-ups specified in Section 07 08 00.

.2 Construct minimum 10 m^2 (100 ft^2) area of each typical wall assembly installation for each type of Material.

.3 Locate at the Site as part of final installation including transitions to glazing systems, below grade assembly, parapet, as well as a typical penetration and other unique project specific details as directed by Contract Administrator.

.4 Do not proceed until mock-up has been reviewed by Contract Administrator.

1.5 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of Section 07 27 00.

.2 Store surface conditioner at temperature above 5°C.

1.6 Site Conditions

.1 Low temperature application:

.1 Perform adhesion test for membrane when ambient temperature is below -5°C.

.2 Proceed with work when temperature is (or is predicted) to fall below -5°C ambient temperature only with the mutual documented agreement of independent inspection and testing company, manufacturer, and applicator.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Air barrier system shall perform as continuous air barrier and as liquid-water drainage plane flashed to discharge to exterior of building envelope incidental condensation or water penetration.

.2 At wall and roof assembly transitions, air barrier system shall perform as continuous air barrier and as liquid-water drainage plane flashed to discharge to exterior of building envelope incidental condensation or water penetration by creation of unobstructed drainage plane that extends across the cladding transition or by flashing to discharge to exterior of building envelope incidental condensation or water penetration.

.3 Air barrier system shall accommodate substrate movement, construction material changes, and transitions at perimeter conditions without deterioration which permits air and water leakage exceeding the following specified limits and requirements, or interruption of the drainage plane:

.1 Air permeance of air barrier material: Maximum 0.02 L/s.m^2 at 75 Pa (0.004 cfm/ft^2 at 1.57 psf) in accordance with ASTM E2178-21a.

.2 Maximum air leakage rate for air barrier assemblies: 0.05 L/s.m2 (0.010 cfm/ft2) when tested in accordance with ASTM E2357-18 at a pressure difference of 75 Pa (1.57 psf).

.3 Water vapour transmission for air and vapour barriers: Maximum 5.7 ng/Pa.s.m^2 (0.1 perms) in accordance with ASTM E96/E96M-16.

.4 Water vapour transmission for vapour permeable air barriers: Minimum 570 ng/Pa.s.m^2 (10 perms) in accordance with ASTM E96/E96M-16.

.5 Air barrier system structural performance while maintaining air barrier performance for air leakage: Air barrier system shall transfer wind loads to structure and shall resist design wind load in accordance with the building code.

.6 Low temperature performance: Minimum -30°C (-22°F).

.7 Compatibility: Air barrier system materials shall be compatible with substrate and adjacent materials with material manufacturers and show no performance deterioration during service conditions.

.8 Self-sealability: in accordance with ASTM D1970/D1970M-21.

.4 Air barrier system shall be joined in an airtight and flexible manner to air barrier material of adjacent building envelope air barrier systems, allowing for relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between the following unless otherwise applicable:

.1 Foundation and walls.

.2 Walls and openings (windows, doors, louvres, and other wall penetrations).

.3 Wall and roof systems.

.4 Wall and roof over unconditioned space.

.5 Walls, floor and roof across construction, control, and movement joints.

.6 Walls, floors and roof to utility, pipe and duct penetrations.

2.3 Materials - General

.1 Single source responsibility: Materials shall be sourced from one manufacturer including sheet membranes, air barrier sealants, primers, mastics and adhesives.

2.4 Sheet-Applied, Vapour Impermeable Self-Adhesive Air and Vapour Barrier Membrane System

.1 Description: Composite preformed membrane system consisting of SBS modified asphalt or butyl backing and polyethylene or polypropylene scrim facer:

.1 Single source responsibility: Components required for complete air barrier system and through wall flashing membrane behind the opaque wall assemblies to be obtained from single manufacturer. Coordinate with Section 04 05 23.

.2 Thickness: 1.0 mm (40 mils) for modified asphalt-based membrane and 0.55 mm (28 mils) for butyl-based membranes.

.3 Application temperature: in accordance with manufacturers written requirements.

.4 Primer: in accordance with manufacturer's written requirements.

.5 Termination and penetration sealing mastic: in accordance with manufacturers written requirements.

.6 Acceptable Materials:

.1 Carlisle Coatings & Waterproofing 'CCW 705'.

.2 GCP Applied Technologies 'Perm-A-Barrier Wall Membrane'.

.3 Henry Company 'Blueskin SA' and 'Blueskin SA LT'.

.4 Soprema 'Sopraseal Stick 1100 T'.

.5 Tremco ExoAir 110AT.

.6 W.R. Meadows 'Air Shield' and 'Low Temperature Air Shield'.

2.5 Sheet-Applied, Self-Adhesive Vapour Permeable Air Barrier Membrane System

.1 Description: Water resistive, vapour permeable, air barrier membrane consisting of a tri-laminate of two outer layers of modified polyolefin or polypropylene, bonded with permeable adhesive layer and split-back release film, complete with manufacturer's recommended primer. Membrane, with physical properties as follows:

.1 Weight: minimum 160 g/m^2 (0.539 ounces/ft^2).

.2 Penetration and termination sealant: in accordance with manufacturer's written requirements.

.3 Acceptable Materials:

.1 Dörken 'Delta-Vent SA'.

.2 Dörken 'Delta-Stratus SA'.

.3 Henry 'Blueskin VP 160'.

.4 Soprema 'Sopraseal Stick VP'.

.5 SRP AirOutshield Inc. 'SRP AirOutshield SA280'.

.6 Vaproshield 'WrapShield SA'.

2.6 Sheet Metal, Air and Vapour Barrier

.1 Sheet metal for metal air and vapour barriers and air seals: Minimum 0.91 mm (20 gauge) thick, sheet steel galvanized in accordance with ASTM A653/A653M-18, Designation G90/Z275.

.2 Sealant for sealing of metal air and vapour barrier: Single component silicone, in accordance with ASTM C920-18, Type M or S, Grade NS, Class 25.

.3 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.4 Fasteners: Self-drilling, galvanized steel fasteners with neoprene washers.

2.7 Expansion Joints

.1 Description:

.1 Manufactured from a proprietary copolymer with internal polyester reinforcement, monolithic seam vulcanization.

.2 Movement and fabrication: Tri-directional movement capability, joint waterproofing system shall be factory fabricated in one piece for the entire contiguous expansion joint or where length of joint exceeds manufacturer's shipping and handling guidelines shall be lapped and vulcanized by manufacturer's mechanics on site, repair of damaged materials shall be performed by manufacturer's mechanics.

.3 Compatible with adhesives and membranes associated with expansion joint construction in accordance with manufacturer's written requirements.

.4 Warranted by manufacturer to cover full warranty duration specified in this section.

.5 Hydrostatic pressure limit: Working pressure in column of water shall perform under static limit not to exceed 10 m (33 ft).

.6 Acceptable Materials: to suit type of roofing assembly and installation, and movement design requirements.

.2 Acceptable Materials:

.1 Soprema 'Soprajoint Plus'.

.2 Situra Inc.'Flamline' or 'Redline'.

.3 Substitutions: in accordance with Section 01 25 00.

PART 3 - EXECUTION

3.1 Installation - General

.1 Surfaces to receive air barrier systems shall be smooth, dry and free from conditions that will adversely affect execution, permanence, or quality of the work of this section.

.2 Air barrier system shall be continuous in the building envelope. Lap and seal air barrier systems in accordance with Material manufacturer's written installation requirements to construction, control, and expansion joints, across junctions between different building assemblies, and around penetrations through the building assembly.

.3 Wrap into jamb, head and sill of building envelope window openings, door openings, and other openings with air barrier system membrane by returning membrane to inside face of opening unless otherwise indicated.

.1 Coordinate air / vapour barrier terminations of work of this section with air / vapour barrier membrane in Section 08 44 00.

3.2 Installation - Sheet Applied, Self-Adhesive Membrane

.1 Apply self-adhering membrane continuous to prepared and primed substrate in an overlapping shingle fashion to shed moisture towards exterior and in accordance with manufacturer's written requirements.

.2 At the end of each day's work seal the top edge of the membrane where it meets the substrate using liquid air seal mastic. Trowel apply a feathered edge to seal termination and shed water.

.3 Apply self-adhering membrane continuous across junctions between different building assemblies, and around penetrations through the building assembly. Provide overlap in accordance with manufacturer's written requirements.

.4 Inspect membrane for punctures, misaligned seams and fishmouths, apply additional layer of membrane over affected area.

3.3 Installation - Sheet Metal Air and Vapour Barrier

.1 Apply sheet metal in an overlapping shingle fashion, staggering vertical joints. Form 10 mm (3/8") x 45 degree lips at lap joints and terminations and fill with sealant.

.2 Overlap sides and ends of sheet a minimum of 50 mm (2").

.3 Mechanically fasten sheet metal to supports at 200 mm (8") on centre.

.4 Ensure projections, including wall ties, are properly sealed by using air barrier manufacturer's compatible sealant.

.5 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.6 Air barrier membrane to be complete and continuous from the wall to the roofing membrane system and waterproofing membrane system, around windows, aluminum screens, hollow metal door frames and spandrel panels.

3.4 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.2 Inspection and testing:

.1 Coordinate with inspection and testing as specified in Section 07 08 00.

.2 Independent inspection and testing company shall perform inspection of completed work.

.3 Perform pull adhesion tests for project substrates in accordance with ASTM D4541-22.

.3 Manufacturer's field review to be in accordance with Section 01 45 00.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Aluminum composite panel cladding.

1.2 Administrative Requirements

.1 Coordination:

.1 Coordinate with installers of wall mounted items, equipment, and mechanical and electrical work so that installation will not subvert the integrity of the cladding system.

.2 Coordinate interface, transition, lapping, flashings and compatibility of membranes with work of Section 07 27 00.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Submit engineered shop drawings.

.2 Indicate panel layout, elevations, dimensions, attachment and anchoring materials and methods, trim and closure pieces, detail and location of joints, sealants and gaskets; include joints necessary to accommodate thermal movement, flashing, accessories and related work of this section.

.3 Indicate methods to achieve watertight assembly, including sealants, penetration seals, drainage path of moisture from within assembly to exterior of envelope.

.4 Indicate materials, thicknesses, finishes, and colours.

.4 Samples:

.1 Selection samples: Submit 3 sets of samples for initial selection purposes to match each colour and finish as indicated. Submit samples as many times as required until approved by Contract Administrator.

.2 Verification samples: Submit 2 - 610 x 610 mm (24" x 24") size samples of panel material, of each colour specified.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit maintenance and cleaning instructions for inclusion in the maintenance manuals.

1.5 Quality Assurance

.1 Qualifications:

.1 Subcontractor:

.1 Has adequate plant, roll forming machinery, equipment, and skilled workers to perform it expeditiously.

.2 Has successfully completed installations similar to that specified during a period of at least the immediate past 5 years.

.2 Manufacturer:

.1 Company with in-house production facilities specializing in manufacturing Materials specified in this section, with 10 years' experience, minimum.

.2 Mock-up:

.1 Coordinate with mock-ups specified in Section 07 08 00.

.2 Construct panels 10 m^2 (100 ft^2) of typical wall cladding installation. Locate on Site as part of final installation at location as indicated at 'MU' detail in Drawings.

1.6 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of Section 07 46 16.

.2 Comply with AAMA CW-10 – Care and Handling of Architectural Aluminum from Shop to Site.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranties:

.1 System:

.1 The warranty is a total system warranty.

.2 Labour, materials, and workmanship for work of this section.

.3 Duration: 5 years.

.2 Aluminum finishes:

.1 Replace aluminum that shows evidence of failure to comply with specified performance requirements of factory-applied finishes within specified warranty period.

.2 Duration: 10 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Design:

.1 Design cladding systems and finishes for expansion and contraction of the system and component materials produced by an exterior surface temperature range of -35°C to +60°C.

.2 Design cladding system to accommodate and withstand the following without permanent deformation or damage to, or failure of, cladding system or building structure:

.1 Deflection of cladding system due to uniformly distributed specified loads shall not exceed L/180 of the span for walls.

.2 Movement within cladding system, and between cladding system and building structure.

.3 Cladding system dead loads, snow loads, ice loads, and wind loads, and combinations thereof, in accordance with the building code.

.1 Design wind loads shall be based on at least 1/50 hourly wind pressure values as indicated in building code and greater values as required, to maximum allowable deflection without permanent deformation.

.3 Design to allow positive drainage of condensation occurring within cladding system to exterior of building envelope or drainage outlet.

.4 Design to allow positive drainage of water to exterior of building envelope or drainage outlet.

.5 Design wall system and secondary support structure as required to accommodate specified erection tolerances of the structure.

.6 Design system to meet tolerances specified.

.7 Panel joinery: Dry-seal, rainscreen joints.

.8 No visible fasteners, telegraphing or fastening on panel faces or any other compromise of neat and flat appearance.

.2 Performance:

.1 Comply with the following performance requirements:

.1 Components for combustible cladding shall be tested and listed for CAN/ULC S134-13 standard and satisfy requirements of building code.

.2 Flame-spread rating: Not more than 25 in accordance with CAN/ULC-S102-10.

.3 Metal fasteners shall be corrosion resistant.

.4 Provide drip detail over windows and door heads, copings, at edges of overhangs, to direct moisture to exterior.

.5 Wall system to utilize drain systems to positively drain water from within wall system to exterior.

.2 Paint system:

.1 Colour shall not fade more than 5 Hunter units when tested according to ASTM D2244-23.

.2 Chalking shall not be in excess of a No. 8 rating when tested according to ASTM D4214-07(2015).

.3 No cracking, checking, peeling, or failure of paint to adhere to bare metal.

2.3 Materials - Panel System

.1 System type:

.1 Concealed fastener with dry joints.

.2 Aluminum panels; composite sheet type with thermosetting core:

.1 Two sheets of aluminum sandwiching a solid core of extruded thermoplastic material formed in a continuous process with no glues or adhesives between dissimilar materials. The core material shall be free of voids and/or air spaces and not contain foamed insulation material. Panel system shall be listed for fire resistance rating.

.1 Bond integrity testing to adhere: in accordance with ASTM D1781-98(2012).

.2 Flame-spread rating: Not more than 25 in accordance with CAN/ULC-S102-10.

.3 Fire test of exterior wall assemblies: in accordance with CAN/ULC S134-13.

.2 Aluminum sheet: tempered, flattened aluminum sheet, 0.5 mm (0.019”) face sheet thickness, 4 mm (0.157”) thick panels in the following alloy:

.1 Painting quality: 3003-H14 in accordance with ANSI H35.1/H35.1M-2017.

.3 Acceptable Materials:

.1 3A Composites ‘Alucobond Plus’.

.2 Mitsubishi Chemical Composites America, Inc. ‘Alpolic FR’.

.3 Substitutions: in accordance with Section 01 25 00.

2.4 Accessories

.1 Aluminum accessory sheet-metal and flashing components:

.1 Aluminum sheet: Aluminum flat sheet in accordance with ASTM B209/B209M-21a, in thicknesses indicated on the reviewed shop drawings and to the following alloy:

.1 Painting quality: 3003-H14 or 3105-H14 in accordance with ANSI H35.1/H35.1M-2017.

.2 Extruded aluminum accessory components:

.1 Aluminum extrusions in accordance with ASTM B221-21, to thicknesses indicated on the reviewed shop drawings and the following alloy:

.1 Alloy: 6063-T52.

.3 Support brackets: Steel brackets to be hot dipped galvanized with zinc coating (0.09 g/m (3.4 mil)) in accordance with CAN/CSA G164-18.

.4 Fasteners: Self-tapping, stainless steel screws.

.5 Insulation:

.1 Semi-rigid insulation: in accordance with Section 07 21 00.

.6 Air barrier membrane: in accordance with Section 07 27 00.

.7 Thermally broken façade substructure:

.1 System shall provide façade substructure with the following attributes:

.1 Thermally broken.

.2 Meet requirements of the building code for non-combustible construction.

.3 Adjustable to permit façade alignment tolerances.

.4 Corrosion resistant performance.

.5 Suitable for rear ventilated rain screen façade design.

.2 Z-girt and sub-girts: Preformed Z275 galvanized metal sheet, 1.22 mm (18 gauge) minimum base steel nominal thickness, notched for drainage, in accordance with ASTM A653/A653M-18, Grade A.

.3 Thermally broken support clips:

.1 Basis of design:

.1 Cascadia Windows & Doors ‘Cascadia Clip’.

.8 Insect screens:

.1 At reveal joints between panels and elsewhere as indicated: minimum 0.23 mm (0.009”) diameter stainless steel wire 18 x 18 mesh.

.9 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.10 Trim, coping, closures, panel splines, and cap pieces:

.1 3.18 mm (0.125") aluminum, to match cladding system.

.2 Factory fabricate components, ready for installation.

.11 Sealant: in accordance with Section 07 92 00.

2.5 Finishes

.1 Exposed aluminum surfaces: Fluoropolymer (70% PVDF) coating system, in accordance with AAMA 2605-22.

.1 Acceptable Materials:

.1 PPG 'Duranar XL'.

.2 Sherwin-Williams ‘Fluropon Classic’.

.2 Colour:

.1 Custom, to match finish in Section 07 46 19. Colour shall be metallic.

2.6 Fabrication

.1 Form to profiles indicated on drawings and to conform with reviewed shop drawings.

.2 Construct panel lines, breaks, and angles sharp and true, and surfaces free from warp and buckle.

.3 Allow for structural movements within the systems, and to accommodate thermal expansion and contraction between panels and structural members.

.4 Fabricate systems to prevent entry of water into building and from collection within system assembly.

.5 Join intersecting parts together to achieve tight, accurately fitted joints with adjoining surfaces in true planes.

.6 Fabricate system to conform to requirements of reference standards specified.

.7 Co-operate with applicable sections to ensure all co-ordination required for proper installation of work of this section in conjunction with and incorporated with other work.

.8 Lay out panels to obtain uniform metal and paint grain finish. Mark direction of metal grain and paint application on back of panels.

2.7 Fabrication Tolerances

.1 Comply with the following maximum tolerances:

.1 Panels:

.1 Bow: 0.2% of panel dimensions up to 3.2 mm (1/8") maximum.

.2 Indicated size:

.1 Up to 1220 mm (4’-0"): plus/minus 0.76 mm (0.030").

.2 1220 mm to 3050 mm (4’-0” to 10’-0”): plus/minus 1.52 mm (0.060").

.2 Square or rectangular: Maximum 3.2 mm (1/8") difference between diagonal measurements.

PART 3 - EXECUTION

3.1 Examination

.1 Take site measurements to ensure that work of this section is fabricated to fit structure; surrounding construction; around obstructions and projections in place, or as shown on drawings; and to suit locations of services.

.2 Verify that backup construction is aligned for proper installation of work of this section before commencing erection.

.3 Notify Contract Administrator in writing of conditions detrimental to proper and timely completion of work. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.2 Air Barrier Membrane Application

.1 Install in accordance with manufacturer's installation requirements and in accordance with Section 07 27 00.

3.3 Insulation

.1 Install insulation in accordance with manufacturer's installation requirements and in accordance with Section 07 21 00.

3.4 Installation

.1 Erect systems complete with flashings forming part of the system, clips, fasteners, closures and caulking to meet same design criteria as specified for fabrication.

.2 Erect panels in straight lines that are true, level, square, and plumb.

.3 Attachment system: Allow for free and noiseless vertical and horizontal thermal movement due to expansion and contraction. Buckling of panels, opening of joints, undue stress on fasteners, failure to sealants or any other detrimental effects due to thermal movement is not permitted. Allow for ambient temperature at time of fabrication, assembly and erection procedures.

.4 Anchor cladding securely as per engineering recommendations and in accordance with reviewed shop drawings to allow for necessary thermal movement, wind loading and structural support.

.5 Cut, flash, and apply sealant to system penetrations. Seal around materials penetrating metal cladding watertight.

.6 Install various components within cladding assembly to provide positive controlled drainage of moisture to exterior of building envelope or drainage outlet.

.7 Conceal fasteners.

.8 Do not install component parts that are observed to be defective, including warped, bowed, dented, and broken members.

.9 Obtain panel symmetry whenever possible relative to openings in both vertical and horizontal plane.

.10 Brake form metal flashings to profile required, in maximum lengths.

.11 Install head and sill flashings, edge trim, cap pieces and other formed profiles as applicable and/or detailed.

.12 Do not cut, trim, weld or braze component parts during erection in manner that would damage finish, decrease strength or result in a visual imperfection or failure in performance. Return component parts that require alteration to shop for refabrication, if possible, or for replacement with new parts.

.13 Execute work in accordance with manufacturing process and field installation procedures under an independent quality assurance program design to confirm that the Material and its application are in accordance with the tested design in accordance with CAN/ULC S134-13.

.14 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

3.5 Installation Tolerances

.1 Comply with the following maximum tolerances:

.1 Plumb: 3.2 mm in 3 m (1/8” in 10’-0”); 6.4 mm in 12.2 m (1/4” in 40’-0”).

.2 Level: 3.2 mm in 3 m (1/8” in 10’-0”); 6.4 mm in 12.2 m (1/4” in 40’-0”).

.3 Alignment:

.1 Where surfaces abut in line or are separated by reveal or protruding element up to 12.7 mm (1/2") wide, limit offset from true alignment to 1.6 mm (1/16").

.2 Where surfaces are separated by reveal or protruding element from 12.7 to 25.4 mm (1/2” to 1”) wide, limit offset from true alignment to 3.2 mm (1/8").

.3 Where surfaces are separated by reveal or protruding element of 25.4 mm (1") wide or more, limit offset from true alignment to 6.4 mm (1/4").

.4 Variation from plane: 3.2 mm in 3.6 m (1/8” in 12’-0”); 12.7 mm (1/2") over total length.

.5 Variation from indicated position: plus/minus 3 mm (1/8").

.2 Tolerances shall not be cumulative.

3.6 Field Quality Control

.1 Conduct quality control in accordance with Sections 01 45 00 and 07 08 00.

3.7 Adjusting and Cleaning

.1 After erection, touch up coatings removed or damaged during erection.

.2 Remove damaged, dented, defaced, defectively finished, or tool marked components and replace with new.

.3 Clean exposed surfaces in accordance with manufacturer's written requirements.

.4 Remove excess sealant with recommended solvent.

3.8 Protection

.1 Protect panels during fabrication, transportation, storage at the Site and erection.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Prefinished metal cladding system.

.2 Linear metal soffit cladding system.

1.2 Administrative Requirements

.1 Coordination:

.1 Coordinate with installers of wall mounted items, equipment, and mechanical and electrical work so that installation will not subvert the integrity of the cladding system.

.2 Coordinate interface, transition, lapping, flashings and compatibility of membranes with work of Section 07 27 00.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Submit engineered shop drawings.

.2 Indicate dimensions, cladding profiles, attachment and anchoring materials and methods, trim and closure pieces, fascia, material finishes and colours, and related work.

.3 Indicate methods to achieve watertight assembly, including sealants, penetration seals, drainage path of moisture from within assembly to exterior of envelope.

.4 Indicate materials, thicknesses, finishes, and colours.

.4 Samples:

.1 Submit 2 - 610 mm x 610 mm (24" x 24") size samples of cladding materials, of each colour and profile specified.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Subcontractor:

.1 Has adequate equipment, and skilled workers to perform the work expeditiously.

.2 Has successfully completed installations similar to that specified during a period of at least the immediate past 5 years.

.2 Mock-ups:

.1 Coordinate with mock-ups specified in Section 07 08 00.

.2 Before proceeding with final purchase of materials and fabrication of metal cladding components, prepare a mock-up of work. Incorporate materials and methods of fabrication and installation identical with project requirements.

.3 Install mock-up at location as indicated at 'MU' detail in Drawings. Retain accepted mock-up as quality standard for acceptance of completed metal cladding.

.4 Provide mock-up of sufficient size and scope to show typical pattern of panel types, soffit, seams, fastening details, edge construction, and finish texture and colour.

.5 Include tie-ins to adjacent construction including at glazing systems and doors, penetrations and other unique details as direct by Contract Administrator.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 System:

.1 The warranty is a total system warranty.

.2 Labour, materials, and workmanship for work of this section.

.3 Duration: 10 years.

.2 Aluminum finishes:

.1 Replace aluminum that shows evidence of failure to comply with specified performance requirements of factory-applied finishes within specified warranty period.

.2 Duration: 10 years.

1.6 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of Section 07 46 19.

.2 Comply with AAMA CW-10 – Care and Handling of Architectural Aluminum from Shop to Site.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Design cladding systems and finishes for expansion and contraction of the system and component materials produced by an exterior surface temperature range of -35°C to +60°C.

.2 Design cladding system to accommodate and withstand the following without permanent deformation or damage to, or failure of, cladding system or building structure:

.1 Deflection of cladding system due to uniformly distributed specified loads shall not exceed L/180 of the span for walls.

.2 Movement within cladding system, and between cladding system and building structure.

.3 Cladding system dead loads, snow loads, ice loads, and wind loads, and combinations thereof, in accordance with the building code.

.1 Design wind loads shall be based on at least 1/50 hourly wind pressure values as indicated in building code and greater values as required, to maximum allowable deflection without permanent deformation.

.3 Design to allow positive drainage of condensation occurring within cladding system to exterior of building envelope or drainage outlet.

.4 Design to allow positive drainage of water to exterior of building envelope or drainage outlet.

.5 Design metal systems to the Architectural Sheet Metal Manual by SMACNA unless otherwise indicated.

.6 Design wall system and secondary support structure to accommodate specified erection tolerances of the structure.

.7 Design system to meet tolerances specified.

.8 Paint system:

.1 Colour shall not fade more than 5 Hunter units when tested according to ASTM D2244-23.

.2 Chalking shall not be in excess of a No. 8 rating when tested according to ASTM D4214-07(2015).

.3 No cracking, checking, peeling, or failure of paint to adhere to bare metal.

2.3 Materials

.1 Preformed aluminum cladding fabricated from preformed sheet metal as follows:

.1 Aluminum sheet:

.1 Coil coated sheet: to ASTM B209/B209M-21a, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

.2 Preformed metal thicknesses:

.1 To 3.2 m height: 1.02 mm (0.040") base aluminum nominal thickness.

.2 Above 3.2 m: 0.81 mm (0.032") base aluminum nominal thickness.

.3 Soffit panels: 0.81 mm (0.032") base aluminum nominal thickness.

.2 Acceptable profile, finish, and colour:

.1 Metal panel type A:

.1 Profile: to match Morin Corporation ‘Matrix MX-3’.

.2 Colour and finish: custom metallic colour to later selection by Contract Administrator.

.2 Metal panel type B:

.1 Profile: to match Morin Corporation ‘Matrix MX-11’.

.2 Colour and finish: custom metallic colour to later selection by Contract Administrator.

.3 Metal panel type C:

.1 Profile: to match Morin Corporation ‘Matrix Classic F-12-0.

.2 Colours and finishes:

.1 Custom metallic colour to later selection by Contract Administrator.

.2 Colour to later selection by Contract Administrator from manufacturer’s standard range.

.4 Metal panel type D:

.1 Profile: to match Morin Corporation ‘Matrix Classic F-12.

.2 Width: non standard, as indicated.

.3 Colours and finishes:

.1 Custom metallic colour to later selection by Contract Administrator.

.2 Colour to later selection by Contract Administrator from manufacturer’s standard range.

.5 Metal panel type E:

.1 Profile: to match Morin Corporation ‘Matrix Classic F-12.

.2 Perforations: 3 mm (1/8") diameter holes, spaced at 6 mm (1/4").

.3 Open area: 23%.

.4 Colour and finish: custom metallic colour to later selection by Contract Administrator.

.6 Metal panel type F:

.1 Profile: to match Morin Corporation ‘Matrix MX-3.

.2 Perforations: 4.8 mm (3/16") diameter holes, spaced at 6 mm (1/4").

.3 Open area: 51%.

.4 Colour and finish: custom metallic colour to later selection by Contract Administrator.

.7 Metal panel type G:

.1 Profile: to match Morin Corporation ‘Matrix MX-11.

.2 Perforations: 4.8 mm (3/16") diameter holes, spaced at 6 mm (1/4").

.3 Open area: 51%.

.4 Colour and finish: custom metallic colour to later selection by Contract Administrator.

.8 Provide metal panels with manufacturer’s standard perforation pattern to meet open area requirements where indicated.

.2 Thermally broken façade substructure:

.1 System shall provide façade substructure with the following attributes:

.1 Thermally broken.

.2 Meet requirements of the building code for non-combustible construction.

.3 Adjustable to permit façade alignment tolerances.

.4 Corrosion resistant performance.

.5 Suitable for rear ventilated rain screen façade design.

.2 Z-girt and sub-girts: Preformed Z275 galvanized metal sheet, 1.22 mm (18 gauge) minimum base steel nominal thickness, notched for drainage, to ASTM A653/A653M-18, Grade A.

.3 Thermally broken spacer systems:

.1 Basis of design:

.1 Cascadia Windows & Doors ‘Cascadia Clip’.

.3 Accessories: exposed trim, end and flute closures, cap pieces, flashings and the like, of same metal material and finish, and colour as prefinished metal panels, unless otherwise indicated.

.4 Insulation: Semi-rigid in accordance with Section 07 21 00.

.5 Air barrier membrane: in accordance with Section 07 27 00.

.6 Exposed sealants: in accordance with Section 07 92 00.

.7 Gaskets: soft, pliable, cold weather grade, PVC foam, extruded profile for outer sheet.

.8 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.9 Fasteners:

.1 Self-drilling, Type 304 stainless steel.

.2 Head finish:

.1 Type 304 stainless steel, in concealed locations.

.2 Prepainted metal, colour to match prefinished metal panels in exposed locations.

.3 Nylon head, colour to match prefinished metal panels in exposed locations.

.10 Insect screens:

.1 At reveal joints between panels and elsewhere as indicated: minimum 0.23 mm (0.009”) diameter stainless steel wire 18 x 18 mesh.

2.4 Metal Finishes

.1 Exposed aluminum surfaces: Fluoropolymer (70% PVDF) coating system, in accordance with AAMA 2605-22.

.1 Acceptable Materials:

.1 Sherwin-Williams ‘Fluropon Classic II’.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Provide coating manufacturer’s standard graffiti-resistant finish to 3.2 m height.

2.5 Fabrication

.1 Form to profiles indicated on drawings and to conform to reviewed shop drawings.

.2 Construct panel lines, breaks, and angles sharp and true, and surfaces free from warp and buckle.

.3 Allow for structural movements within the systems, and to accommodate thermal expansion and contraction between panels and structural members.

.4 Fabricate siding panel systems to prevent entry of water into building and from collection within system assembly.

.5 Join intersecting parts together to provide tight, accurately fitted joints with adjoining surfaces in true planes.

.6 Fabricate formed and notched metal closures to close-off flutes at exterior. Seal also with neoprene foam filler.

.7 Cooperate with applicable sections to ensure coordination required for proper installation of work of this section in conjunction with and incorporated with other work.

.8 Fabricate metal cladding panels in one length; maximum 6000 mm (20') for horizontal application; 12000 mm (40') for vertical application; unless otherwise indicated.

.9 Prefinished metal panel terminations shall not have a raw metal edge or exposed fasteners. Panel ends for non-corrugated panels shall be folded.

PART 3 - EXECUTION

3.1 Examination

.1 Take measurements at the Site to ensure that the work of this section is fabricated to fit structure, surrounding construction, around obstructions and projections in place.

.2 Verify that backup construction is aligned for proper installation of prefinished metal panel system before commencing erection.

3.2 Air Barrier Membrane Application

.1 Install in accordance with manufacturer's written installation requirements and in accordance with Section 07 27 00.

.2 Surfaces must be smooth, clean dry and free from loose contaminants. Brushing and/or scraping of block and concrete surfaces may be required to adequately prepare surface.

.3 Apply primer for membrane work.

.4 Wrap openings with membrane returning to inside face of openings.

.5 Ensure air barrier seals into adjacent systems for complete air barrier to building envelope.

.6 Seal around materials penetrating membrane in accordance with manufacturer’s written requirements.

3.3 Insulation

.1 Install insulation in accordance with manufacturer's written installation requirements and in accordance with Section 07 21 00.

.2 Cut backs of pieces as required to fit over projecting anchors, fastenings or similar protrusions. Fit boards with tight joints around obstructions, openings, corners, and structural members.

.3 Apply insulation to ensure total and complete coverage of surfaces indicated to be insulated, and in direct contact with such surfaces.

.4 Use largest possible dimensions to reduce number of joints.

3.4 Cladding System Installation

.1 Erect systems complete with flashings forming part of the system, clips, fasteners, closures and sealant to meet same design criteria as specified for fabrication.

.2 Erect panels in straight lines that are true, level, square, and plumb to comply with installation tolerances.

.3 Attachment system: Allow for free and noiseless vertical and horizontal thermal movement due to expansion and contraction for material temperature range. Buckling of panels, opening of joints, undue stress on fasteners, failure to sealants or any other detrimental effects due to thermal movement is not permitted. Allow for ambient temperature at time of fabrication, assembly and erection procedures.

.4 Anchor cladding securely per engineering recommendations and in accordance with reviewed shop drawings to allow for necessary thermal movement, wind loading and structural support.

.5 Install sealant between work of this section and work of other sections to meet specified requirements of Section 07 92 00 and to provide a watertight installation.

.6 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.7 Cut, flash, and apply sealant to system penetrations. Seal around materials penetrating metal cladding watertight.

.8 Install various components within cladding assembly to provide positive controlled drainage of moisture to exterior of building envelope or drainage outlet.

.9 Conceal fasteners.

.10 Do not install component parts that are observed to be defective, including warped, bowed, dented, and broken members.

.11 Obtain panel symmetry whenever possible relative to openings in both vertical and horizontal plane.

.12 Break form metal flashings to profile required, in maximum lengths.

.13 Install head and sill flashings, edge trim, cap pieces and other formed profiles as applicable and detailed.

.14 Apply sealant to face of supports for top and bottom closure flashings and at supports for perimeter closure flashings and returns.

.15 Do not cut, trim, weld or braze component parts during erection in manner that would damage finish, decrease strength or result in a visual imperfection or failure in performance. Return component parts that require alteration to shop for refabrication, if possible, or for replacement with new parts.

3.5 Metal Cladding Installation Tolerances

.1 Maintain the following installation tolerances:

.1 Maximum variation from plane or location shown on reviewed shop drawings: 20 mm (3/4")/10 m (32.8’) of length and up to 30mm (1-1/6")/100 m (328’) maximum.

.2 Maximum offset from true alignment between two adjacent members abutting end to end or side-by-side, in line: 1 mm (0.039").

.3 Flatness: Maximum deviation from flatness shall be 3.2 mm (1/8") in 1520 mm (5’) on panel in any direction for assembled units.

3.6 Field Quality Control

.1 Quality control to be in accordance with Sections 01 45 00 and 07 08 00.

3.7 Adjusting and Cleaning

.1 After erection, touch up coatings removed or damaged during erection.

.2 Remove damaged, dented, defaced, defectively finished, or tool marked components and replace with new.

.3 Wash down exposed interior and exterior surfaces using solution of mild domestic detergent in warm water, applied with soft clean wiping cloths. Wipe interior surfaces clean as part of final clean-up.

.4 Remove excess sealant with recommended solvent.

3.8 Protection

.1 Protect panels during fabrication, transportation, storage at the Site and erection.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Two-ply modified bituminous membrane roofing assembly; as follows:

.1 Exposed membrane roofing system.

.2 Associated roofing accessories and Materials.

1.2 Administrative Requirements

.1 Coordination:

.1 Coordinate with Divisions 21, 22, and 23 to ensure that roof drains are suitable for roofing system design.

.2 Coordinate with installers of roof mounted items, equipment, and mechanical and electrical work at roof so that installation will not subvert the integrity of the roofing system.

.3 Coordinate with installation of air barrier at walls to ensure complete continuity of air barrier system for building. Roofing air barrier membrane to lap by 75 mm (3") minimum and terminate with wall system air barrier membrane.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

.2 The manufacturer shall meet with the necessary parties at the jobsite to review and discuss project conditions as it relates to the integrity of the roofing assembly.

.3 Meet with Contract Administrator, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.

.4 Review methods and procedures related to roofing installation, including manufacturer's written requirements.

.5 Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

.6 Examine substrates and existing conditions for compliance with requirements, including flatness and fastening.

.7 Review structural loading limitations of roof deck during and after roofing.

.8 Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.

.9 Review governing regulations and requirements for insurance and certificates if applicable.

.10 Review temporary protection requirements for roofing system during and after installation.

.11 Review roof observation and repair procedures after roofing installation.

.12 Forecasted weather conditions.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for each type of product indicated.

.3 Roofing manufacturer’s warranty and design criteria:

.1 Submit roofing manufacturer’s warranty specimen and warranty design criteria prior to commencement of roofing work.

.4 Shop drawings; general details:

.1 Include plans, elevations, sections, details, and attachments to other work for the following:

.1 Base flashings, cants where required, drain detailing, membrane terminations and penetrations.

.2 Tapered insulation, including slopes.

.3 Crickets, saddles, and tapered edge strips, including slopes.

.5 Roofing manufacturer’s warranty sample and wind uplift compliance reports:

.1 Manufacturer’s pre-installation notification: Submit copy of completed roofing manufacturer’s pre-installation notification form at least 10 Working Days prior to commencement of roofing installation.

.2 Warranty sample: Submit copy of roofing manufacturer’s warranty specimen including warranty requirements prior to commencement of roofing installation.

.3 Roofing assembly wind uplift compliance reports: Submit roof system assessment reports for applicable CSA A123.21-14 compliant roof assemblies required to meet requirements for indicated wind uplift pressures and indicated roofing assembly configurations.

.6 Samples:

.1 Submit samples complete with manufacturer's labels intact, of materials to be used for work of this section prior to commencement of work. Allowing ample time for review and acceptance by Contract Administrator and roofing inspection company. Do not proceed with work until samples are accepted.

.7 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's maintenance instructions for incorporation into the operation and maintenance manuals.

1.5 Quality Assurance

.1 Qualifications:

.1 Manufacturers: Company specializing in manufacturing the Materials specified in this section, with minimum 10 years experience.

.2 Installers / applicators / erectors:

.1 Installers: Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified and with approval and training of Material manufacturers.

.2 Subcontractor: Shall be a member in good standing of the Canadian Roofing Contractors Association (CRCA) and Roofing Contractors Association of Manitoba (RCAM).

.3 Roofing Subcontractor must be approved by the membrane manufacturer for the warranty program specified. Submit Subcontractor's certification letter prepared by the membrane manufacturer.

.2 Execute work of this section only under full time supervision of qualified Subcontractor's site supervisor.

.3 Mock-up:

.1 Coordinate with mock-ups specified in Section 07 08 00.

.2 Prepare a 10 m² (100 ft²) mock-up of the work of this section. Incorporate materials and methods of fabrication and installation identical with project requirements.

.3 Install mock-up at roof area location directed by Contract Administrator. Retain accepted mock-up of sufficient size and scope to show typical pattern of seams, fastening details, edge construction, parapet transition, and workmanship.

.4 Construct mock-up with each layer staggered to show each component.

1.6 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of Section 07 52 16.

.2 Do not store roofing materials on roof.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Roofing manufacturer shall provide total system warranty:

.1 Issue a written document in the City's name, valid for duration listed below, for the repair of leaks in the roofing system to restore the roofing system to dry and watertight condition, to the extent that manufacturing or installation defects caused water infiltration.

.2 Entire cost of the repair(s) required to maintain dry and watertight roofing system during the full warranty duration.

.3 Labour, materials, and workmanship for the work of this section.

.4 Non-prorated with no dollar limit (NDL) for duration of warranty.

.5 Duration: 20 years.

PART 2 - PRODUCTS

2.1 Roofing System Manufacturer

.1 Acceptable roof system manufacturers, subject to compliance with requirements of the Contract Documents:

.1 Henry Company.

.2 Johns Manville.

.3 Soprema.

.4 Tremco Incorporated.

2.2 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

.5 All roofing components to be lead free.

2.3 Performance/Design Requirements - General

.1 Single source responsibility:

.1 Provide Materials from one roofing system manufacturer for the work of this section, including accessory Materials and materials.

.1 Where roofing system manufacturer does not manufacture or supply required accessory Materials and materials, any such accessory Materials or materials supplied for use in the Work shall have approval from roofing system manufacturer for use as part of the final warrantied installation.

.2 Wind uplift:

.1 The roofing system shall include roofing system materials required to achieve wind uplift load requirements and roofing membrane manufacturer's warranty.

.1 Wind uplift pressures: as indicated on structural drawings.

.2 Roofing materials, components, and assemblies shall resist environmental and wind (uplift) loads, and effects of those loads in accordance with the building code.

.3 Roofing assembly shall have been successfully tested in accordance with CSA A123.21-14 for indicated wind uplift pressures and indicated roofing assembly configurations.

.3 General performance: Installed roofing system and base flashings shall withstand wind uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing system and base flashings shall remain watertight.

.4 Material compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

.5 Roofing system: Prevent water from entering building and roofing assembly through roofing membrane.

.6 Roofing system design: Provide roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to the building code.

.7 Roof covering classification: Roof assembly shall have a Class A classification as determined in conformance with CAN/ULC S107-19 "Standard Methods of Fire Tests of Roof Coverings".

.8 Air barrier shall accommodate substrate movement, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding the following specified limits and requirements:

.1 Air permeance of air barrier material: Maximum 0.02 L/s m^2 at 75 Pa (0.004 cfm/ft^2 at 1.57 psf) in accordance with ASTM E2178-21a.

.2 Water vapour transmission for air / vapour barriers: Maximum 5.7 ng/Pa.m^2.s. (0.1 perms).

.3 Pull-off strength of liquid or sheet applied membrane and laps: Cohesive or substrate failure permitted when tested to specified wind load. Air barrier system shall transfer wind load to structure and shall resist 100% of design wind load or minimum of 2.15 kPa (45 psf), whichever is greater.

.4 Low temperature flexibility: to -30°C (-22°F) in accordance with CGSB 37-GP-56M-1985.

.9 Air barrier system shall be joined in an airtight and flexible manner to air barrier material of adjacent building envelope air barrier systems, allowing for relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between the following unless otherwise applicable:

.1 Walls and openings.

.2 Across construction, control, and expansion joints.

.3 Penetrations.

2.4 Roof Membrane and Flashing Sheets

.1 Roofing membrane base sheet: At Contractor's option, use either site applied base sheet or cover board with shop applied base sheet, but use only one type throughout the Work.

.1 Cover board with integral (shop applied) base sheet; liquid adhesive installed:

.1 High performance base sheet composed of SBS modified bitumen, non-woven polyester reinforced membrane, factory-laminated on semi-rigid asphaltic board.

.2 Membrane thickness: 2.2 mm minimum.

.2 Roof membrane base sheet and base sheet flashing: SBS-modified asphalt membrane sheet with reinforced elastomeric bitumen:

.1 CSA A123.23-15, Type C, Grade 3, composite reinforced.

.2 Base sheet membrane:

.1 Recreation centre: Heat-welded (torched).

.2 Child care centre: Mechanically fastened.

.3 Base sheet flashing membrane:

.1 Recreation centre: Heat-welded (torched).

.2 Child care centre: Self-adhered.

.2 Roof membrane base sheet and base sheet flashing: SBS-modified asphalt membrane sheet with reinforced elastomeric bitumen:

.1 CSA A123.23-15, Type C, Grade 3, composite reinforced.

.3 Roofing membrane cap sheet and cap sheet flashing: SBS-modified asphalt membrane sheet with reinforced elastomeric bitumen, protected by coloured granules:

.1 CSA A123.23-15,CGSB 37.56, Type C, Grade 1, composite reinforced.

.2 Cap sheet membrane:

.1 Recreation centre: Heat-welded (torched).

.2 Child care centre: Self-adhered.

.3 Cap sheet flashing membrane:

.1 Recreation centre: Heat-welded (torched).

.2 Child care centre: Self-adhered.

.4 Roofing cap sheet membrane shall be surface covered with granules:

.1 Granule colour: as selected by Contract Administrator.

2.5 Roof Assembly Materials - Exposed Membrane Roofing

.1 Substrate board:

.1 Provide either glass-mat faced substrate board or fibre-reinforced substrate board in accordance with roofing manufacturer's written requirements and recommendations for use as substrate for adhering roofing membrane components.

.2 Substrate board; glass-mat faced board: in accordance with ASTM C1177/C1177M-17, glass-mat, water-resistant gypsum substrate, factory primed.

.1 Acceptable Materials:

.1 CGC 'Securock UltraLight Coated Glass-Mat Roof Board'.

.2 Georgia Pacific 'DensDeck Prime Roof Board'.

.3 Substitutions: in accordance with Section 01 25 00.

.3 Substrate board; fibre-reinforced board: in accordance with ASTM C1278/C1278M-17, fibre-reinforced, water-resistant gypsum board.

.1 Acceptable Materials:

.1 USG 'Securerock Gypsum-Fiber Roof Board'.

.2 Substitutions: in accordance with Section 01 25 00.

.4 Exterior grade plywood sheathing: in accordance with Section 06 10 53.

.2 Air and vapour barrier:

.1 Provide either self-adhering or heat welded sheet in accordance with roofing manufacturer's written requirements and recommendations.

.2 Self-adhering sheet:

.1 Minimum of 0.8 mm (30-mil) thick, polyethylene film laminated to layer of rubberized asphalt adhesive; cold-applied, with release paper backing. Provide primer when recommended by sheet manufacturer.

.2 Acceptable Materials:

.1 Soprema 'SopraVap'r'.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Heat welded sheet:

.1 Glass mat reinforcement and SBS-modified asphalt membrane sheet to CGSB 37.56.

.2 Thickness: 2.2 mm (0.087") minimum.

.3 Acceptable Materials:

.1 Soprema 'Elastophene SP'.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Roof insulation:

.1 General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.

.2 Rigid polyisocyanurate insulation board, inorganic felt faced:

.1 Description: Closed-cell polyisocyanurate foam core integrally laminated to heavy, durable and dimensionally stable inorganic coated-glass facers, in accordance with CAN/ULC S704.1-17 Type 2 and Class 2 or 3, HCFC free, 138 kPa (20 psi) minimum compressive strength (at 10% deformation), CAN/ULC-S126-14, LTTR value to CAN/ULC S770-15.

.3 Tapered insulation: Provide factory-tapered insulation boards fabricated to slope of 1:48 (1/4 inch per 12 inches) unless otherwise indicated.

.4 Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated, and no less than 1:48 (1/4 inch per 12 inches) in addition to roof structure slope or to tapered insulation slope as applicable.

.4 Cover board; where cover board with integral base sheet is not being used:

.1 Cover board; multi-ply, semi-rigid asphaltic roofing substrate board: Mineral fortified asphaltic core formed between two asphaltic saturated fibreglass liners.

.2 Thickness: 6.4 mm (1/4"), unless otherwise indicated.

.5 Insulation accessories:

.1 General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with roofing assembly.

.2 Insulation adhesive: as recommended by insulation and membrane manufacturer.

2.6 Auxiliary Roofing Membrane Materials

.1 General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing system.

.2 Mastic sealant: Polyisobutylene, plain or modified bitumen, non-hardening, non-migrating, non-skinning, and non-drying.

.3 Metal flashing sheet: in accordance with Section 07 62 00.

.4 High temperature membrane: in accordance with Section 07 62 00.

.5 Miscellaneous accessories: Provide miscellaneous accessories recommended by roofing manufacturer.

.6 Primer: in accordance with manufacturers written requirements.

.7 Fasteners and restraints:

.1 General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing system.

.2 Factory-coated steel fasteners and plates complying with corrosion-resistance provisions in FM 4470, designed for fastening roofing components to substrate, tested by manufacturer for required pullout strength and wind uplift resistance, and acceptable to roofing manufacturer.

.3 Termination bars: Pre-punched aluminum bar 25 mm (1") wide x 1.5 mm (1/16") thick x 3048 mm (10 ft) long with 6.4 mm (1/4") x 9.5 mm (3/8") slotted holes on 200 mm (8") centres.

.8 Cant strips: as recommended by membrane manufacturer.

.9 Waterproofing sealer and penetration flashing membrane:

.1 Flashing membrane:

.1 One component bitumen/polyurethane waterproofing complete with polyester reinforcement fabric to form reinforced field membrane.

.1 Acceptable Material:

.1 Soprema ‘Alsan Flashing’.

.2 Substitutions: in accordance with Section 01 25 00.

.2 PMMA liquid roof membrane:

.1 For locations where torched applied sheet membrane cannot be detailed or installed; locations to be reviewed and approved by Contract Administrator prior to installation.

.2 Two-component polymethyl methacrylate-based (PMMA) liquid membrane combined with fleece fabric to form monolithic, self flashing and self-adhering reinforced field membrane.

.1 Acceptable Material:

.1 Soprema ‘Alsan RS230 Flash’.

.2 Substitutions: in accordance with Section 01 25 00.

.10 Ballast reducing scrim fabric/flotation fabric:

.1 100% woven HDPE fabric, UV stabilized, water permeable, 0.5 mm (2 mil) thickness, with a tensile strength of 400 N.

.11 Aggregate surfacing (gravel ballast): gravel with no foreign material, in accordance with ASTM D1863/D1863M-05(2018), water washed, dry, free of dirt and dust, hard, dry, clean, and graded in sizes from 9 mm (3/8") to 12 mm (1/2").

.12 Roof membrane walkway (service walkway):

.1 Description: Waterproofing membrane composed of SBS modified bitumen and unwoven polyester reinforcement. The top face is covered with black granules; the underface is protected by a thermofusible film.

.1 Primer: as recommended by roofing manufacturer.

.2 Acceptable Materials:

.1 Soprema ‘SOPRAWALK’.

.2 Substitutions: in accordance with Section 01 25 00.

.13 Flame guard tape:

.1 Description: Self-adhesive flame stop membrane composed of glass fleece reinforcement and SBS modified bitumen.

2.7 Precast Pavers

.1 Precast paver slabs: in accordance with CSA A231.1-19/A231.2-19, 610 mm (24") square, slip resistant textured finish, minimum 45 MPa (6526 psi) compressive strength, minimum 4.5 MPa (653 psi) (mean) flexural strength, minimum 4.5% (by mass) water absorption, maximum allowable average loss of mass of not greater than 50 g/m^2 (0.16 oz/ft^2) after 28 cycles.

.1 Thickness: as required by engineered shop drawings for wind uplift.

.2 Precast support pads: 25 mm (1") thick, extruded expanded polystyrene insulation, in accordance with CAN/ULC S701.1-17, Type 4, Class B, self-extinguishing, 35 psi at 5% deflection compressive strength.

2.8 Expansion Joints

.1 Description:

.1 Manufactured from a proprietary copolymer with internal polyester reinforcement, monolithic seam vulcanization.

.2 Movement and fabrication: Tri-directional movement capability, joint waterproofing system shall be factory fabricated in one piece for the entire contiguous expansion joint or where length of joint exceeds manufacturer's shipping and handling guidelines shall be lapped and vulcanized by manufacturer's mechanics on site, repair of damaged materials shall be performed by manufacturer's mechanics.

.3 Compatible with adhesives and membranes associated with expansion joint construction in accordance with manufacturer's written requirements.

.4 Warranted by manufacturer to cover full warranty duration specified in this section.

.5 Hydrostatic pressure limit: Working pressure in column of water shall perform under static limit not to exceed 10 m (33 ft).

.6 Acceptable Materials: to suit type of roofing assembly and installation, and movement design requirements.

.2 Acceptable Materials:

.1 Soprema 'Soprajoint Plus'.

.2 Situra Inc.'Flamline' or 'Redline'.

.3 Substitutions: in accordance with Section 01 25 00.

PART 3 - EXECUTION

3.1 Examination

.1 Examine substrates, areas, and conditions, with roofing installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

.1 Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.

.2 Verify that blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

.3 Metal deck:

.1 Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 05 31 10.

.4 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Preparation

.1 Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing manufacturer's written requirements. Remove sharp projections.

.2 Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 Installation - General

.1 Prepare surfaces and complete waterproofing work in conformance with roofing manufacturer’s written requirements.

.2 Install roofing system elements on clean and dry surfaces, in conformance with manufacturer's written requirements.

.3 Roofing system work must be completed in a continuous fashion as surfaces are readied and weather conditions permit.

.4 Seal seams that are not covered by a cap sheet membrane in the same day. Do not install cap sheet when moisture is present at/in the base sheet seams.

.5 Ensure waterproofing conditions for roofs at all times, including protection during installation work by other trades and progressive protection as work is completed (e.g. vents, drains, and other work which penetrates roofing membrane.).

.6 Lay roofing membrane free from wrinkles, air pockets, fishmouths, tears, and prominent lap joints. Full bond cap sheet to base sheet. Seams shall be lapped and fully bonded.

.7 Prior to installation of base sheet and cap sheet, allow sheet to relax after unrolling. Relax time to be as recommended by manufacturer based on concurrent ambient temperature.

.8 Extend roofing to outer edges of roof and up vertical surfaces at least 200 mm (8”) above horizontal roofing, and full height beneath counter flashing and top of curb flashing.

.9 Complete roofing up to line of termination for each day’s work.

.10 Roofing systems adhered with cold adhesive, and where insulation at bottom of vertical upstand is greater than 150 mm (6") in thickness: Install continuous fastening bar and anchors at bottom of vertical upstand (screws and plates with length greater than 150 mm (6") are not permitted).

3.4 Substrate Board (Sheathing/Underlay)

.1 Lay substrate board with tightly butted joints. Longitudinal joints must be at right angles to flute direction. Joints occurring along widths of board to be continuously supported on top flange of metal deck. Stagger end joints of adjacent board by 1/2 the board width.

.2 Ensure substrate board is immediately protected with membrane.

.3 Mechanical fasteners to penetrate top flutes only; by no less than 19 mm (3/4") and by no more than 25.4 mm (1"). Check underside of deck before installation to eliminate damaging existing conditions below deck.

3.5 Application of Primer

.1 Roofing substrates surfaces shall receive a coat of primer at a rate required by roofing manufacturer's written requirements.

.2 Surfaces to be primed must be free of rust, dust or any residue that may hinder adherence.

.3 Cover primed surfaces with roofing membrane as soon as possible (same day coverage for self-adhesive membranes).

3.6 Air and Vapour Barrier

.1 Self-adhering sheet: Prime substrate if required by manufacturer. Install self-adhering sheet over area to receive sheet, side and end lapping each sheet a minimum of 90 mm (3-1/2") and 150 mm (6"), respectively. Seal laps by rolling.

.2 Completely seal air and vapour barrier at terminations, obstructions, and penetrations to prevent air movement into roofing.

3.7 Insulation Application - Conventional Roofing

.1 Comply with roofing manufacturer's written requirements for installing roof insulation.

.2 Install insulation adhesive in accordance with roofing manufacturer's written requirements.

.3 Stagger and offset vertical joints from preceding insulation boards, 305 mm (12").

.4 Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

.5 Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

.6 Install only as much insulation as can be covered with membrane roofing in the same day.

.7 Install insulation boards with edges in moderate contact without forcing and fill gaps greater than 6 mm (1/4") with insulation.

.8 Cut insulation to fit to blocking, upstands, and penetrations through roof; fill gaps greater than 6 mm (1/4") with insulation.

.9 Reduce thickness of insulation at roof drains by 13 mm (1/2") for a distance of 610 mm (24") from centre drain.

.10 Install tapered insulation under area of roofing to conform to slopes indicated. Use adhesive as recommended by insulation and membrane manufacturer.

.11 Protect and keep insulation dry (in new condition). Do not install insulation which is not in dry condition.

3.8 Aggregate Ballast and Pavers

.1 Ballast installation:

.1 To roofed area, apply aggregate ballast uniformly over scrim fabric at rate required by insulation manufacturer, and greater amounts as required by engineered shop drawings.

.2 Roof pavers.

.1 Place concrete roof pavers over one-piece polystyrene insulation pads, sized to 50 mm (2") from edge of paver, with 3 mm (1/8") paver joints.

3.9 Cover Board

.1 Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 300 mm (12") in each direction. Loosely butt cover boards together. Tape joints if required by roofing manufacturer.

.2 Where cover board with integral base sheet is being used:

.1 Install in accordance with manufacturer's written requirements. Apply insulation adhesive to underside and immediately bond board to substrate.

3.10 Installation of Roofing Membrane and Roofing Membrane Flashings

.1 Tape substrate joints in substrate to prevent the passage of flame using flame guard tape.

.2 Install membrane in accordance with manufacturer's requirements.

.3 Install roofing membrane free of wrinkles, air pockets or fishmouths. Provide homogenous seam.

.4 Cut off corners at end laps to be covered by the next roll.

.5 Install a reinforcing gusset in all inside and outside corners.

.6 Seal overlaps at the end of the workday.

.7 After installation of cap sheet, check lap seams on cap sheet.

3.11 Roofing Details

.1 Install as indicated on drawings and with various roofing details illustrated in roofing manufacturer's written requirements.

3.12 Waterproof Expansion Joint Installation

.1 Install all components of the system in accordance with the manufacturer's written requirements.

.2 The system is to be wholly encapsulated between the plies of the modified bitumen membrane in a roofing system.

3.13 Roof Drains

.1 Ensure that roof drains are set to permit drainage, located at lowest possible location, and properly secured. Cut and slope insulation at each drain to form a sump and to accommodate flashing immediately surrounding drain. Review final locations with Contract Administrator prior to installation of drains.

.2 Drain sumps:

.1 Install tapered insulation. Drain sumps to be 1200 mm x 1200 mm (48” x 48”) unless otherwise indicated on drawings.

.2 Apply waterproofing sealer (penetration flashing) membrane to drain sump area, complete with fleece reinforcing fabric to form reinforced field membrane.

.3 Embed coloured granules to match installation to granulated roofing cap sheet.

.3 Temporarily block drain pipes during application of membrane. Remove blocking when work is not in progress and after work of this section is completed.

.4 Carry membrane and insulation to edge of drain base and trim around drain opening. Top ply to be granulated cap sheet flashing to minimum 200 mm (8”) from edge of drains.

.5 Ensure that installation of drain and membrane is performed in accordance with recommendations of drain manufacturer.

.6 Prime drain flange and allow to dry.

.7 Embed first felt ply in a coat of waterproofing mastic and extend plies of felt into the drain opening of drains, and trim as required.

.8 Fill void between drain body and roof insulation board/base structure support with two-component polyurethane foam insulation.

3.14 Roof Penetrations

.1 Install curb flashings around ducts, pipes, structural steel, and other projections through membrane systems in conformance with manufacturer's written requirements and as detailed.

.2 Install penetration flashing supplied under work of mechanical and under the work of this section, in accordance with roofing manufacturer’s installation requirements.

.3 Prime metal flanges with primer and allow solvents to flash off prior to installation.

.4 Remove poly film on areas to receive metal flashing. Set metal flange in full layer of waterproofing mastic to provide positive bond and seal.

.5 Install base ply to the base of the metal flashing staying short of curved metal section.

.6 Install cap ply to the base ply flashing ensuring a full bond to the base ply and apply bead of waterproofing sealer at the termination point.

.7 Install penetration flashing membrane and fleece in accordance with manufacturer’s requirements.

3.15 Metal Flashings

.1 Install metal flashings and high temperature membrane in accordance with Section 07 62 00.

3.16 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00 and as follows:

.1 Inspection and testing:

.1 Prior to installation of cap sheet membrane, base sheet membrane installation shall be reviewed by manufacturer and inspection and testing company, who shall each submit field review reports to the Contract Administrator.

.2 Independent inspection and testing company shall perform:

.1 Inspections and provide inspection reports.

.2 Tests and provide test reports:

.1 Core cuts (if requested).

.3 Moisture survey:

.1 Submit results of a non-destructive moisture test of roof system completed by approved third party. Utilizing one of the approved methods:

.1 Infrared Thermography.

.2 Nuclear Backscatter.

.3 Coordinate with inspection and testing as specified in Section 07 08 00.

.2 If test results or inspections show roofing does not comply with requirements, remove and replace or repair the roofing as recommended in writing by manufacturer, and make further repairs after retesting and inspecting until roofing installation passes.

.2 Manufacturer’s field review to be in accordance with Section 01 45 00.

3.17 Adjusting and Cleaning

.1 Remove applicator's equipment and debris as work progresses, and at completion of the work of this section in accordance with Sections 01 78 00 and 01 74 00.

.2 Remove bituminous markings from finished surfaces.

.3 Repair or replace defaced or disfigured finishes caused as a result of the work of this section.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Supply and installation of prefinished aluminum flashings.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Shop drawings:

.1 Submit shop drawings including the following:

.1 Plans, elevations, sections, and attachment details.

.2 Detail fabrication and installation layouts, expansion-joint locations, and key details. Distinguish between shop and field assembled work.

.3 Include identification of material, thickness, weight, and finish for each item and location in the work.

.4 Include details for forming, including profiles, shapes, seams, and dimensions.

.5 Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.

.6 Include details of termination points and assemblies.

.7 Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contracting from fixed points.

.8 Include details of roof penetrations flashing.

.9 Include details of edge conditions, and counter flashings as applicable.

.10 Include details of special conditions.

.11 Include details of connections to adjoining work.

.3 Samples:

.1 Submit full-size samples of each specified flashing material formed to detailed profile including corner, curb, cap, and parapet flashing, and coping including lock-joints and hold-down clips.

.2 Submit 2 - 50 mm x 50 mm (2" x 2") samples of each type of sheet metal material, colour and finish.

.4 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit documentation to verify compliance with LEED objectives and requirements.

1.3 Quality Assurance

.1 Qualifications:

.1 Installers / applicators / erectors:

.1 Installers: Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

.2 Sealant shall be applied by a Subcontractor of recognized standing, having preferably not less than 5 years of proven experience in this type of work, and who has the necessary equipment and skilled mechanics to carry out the work of this section satisfactorily and can substantiate this to satisfaction of Contract Administrator.

.2 Quality standards:

.1 Quality of fabrication and installation of sheet metal work shall comply with recommendations published by Sheet Metal and Air Conditioning Contractors National Association.

1.4 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of Section 07 62 00.

.2 Comply with AAMA CW-10 – Care and Handling of Architectural Aluminum from Shop to Site.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29, 01 74 19, 01 81 19, and 01 33 29, as applicable.

.2 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.3 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

.4 All roofing components to be lead free.

2.2 Prefinished Aluminum Flashing

.1 Aluminum flat sheet: Flat aluminum sheet in accordance with ASTM B209/B209M-21a, to the following minimum thickness and alloy:

.1 Painting quality: 3003H14 or 3105H14 to ANSI H35.1/H35.1M-2017.

.2 Minimum thickness, unless noted otherwise:

.1 Typical: 1.02 mm (0.040").

.2 Bent plate flashing profile: 1.02 mm (0.040").

.3 At parapets: 1.27 mm (0.050").

2.3 Prefinished Metal Finishes

.1 Provide the following finish to exposed prefinished aluminum:

.1 70% Kynar 500 or Hylar 5000 fluoropolymer resin systems, ceramic pigments and other select inorganic pigments to AAMA 2605-22.

.1 Acceptable Materials:

.1 Sherwin-Williams ‘Fluropon Classic II’.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Colour: Allow for 4 colours, to later selection by Contract Administrator to match exterior finishes. Colour shall be metallic.

2.4 Accessories

.1 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.2 Sealants:

.1 Exposed sealants: Silicone in accordance with Section 07 92 00, colour as selected by Contract Administrator from manufacturer's full range.

.2 Concealed flashing sealants; hooked-type expansion joints with limited movement: Butyl sealant to ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied.

.3 Cleats: of matching metal to flashing material, continuous, and of greater thickness than flashing material. Offset joints in cleats 305 mm (12”) with joints in perimeter edge metal. Allow a 12.7 mm (1/2") gap between pieces.

.4 Fasteners:

.1 Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.

.2 General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head:

.1 Exposed screws: 38 mm (1-1/2") long minimum at 450 mm (18") on centre maximum. Heads matching colour of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM washer under heads of exposed fasteners.

.2 Blind fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

.3 Cleat fasteners: Corrosion-resistant barbed angular ring or screw shank nail; length to achieve approximately 32 mm (1-1/4") penetration into nailer.

.3 Fasteners for prefinished aluminum sheet: Aluminum or Series 300 stainless steel.

.4 Fasteners and plates to meet the requirements of FM 4470-12 for wind uplift and corrosion resistance.

.5 Flexible flashing membrane; high temperature grade for use at locations where membrane is not protected by insulation (indicated on Drawings as waterproofing membrane):

.1 Description:

.1 Self-adhesive grade rubberized membrane backed by high density polyethylene.

.2 High temperature grade to resist softening at 105°C minimum.

.3 Thickness: 0.76 mm (30 mils) minimum.

.4 Primer for substrate.

.2 Acceptable Materials:

.1 Henry 'Blueskin PE 200 HT'.

.2 Elevate ‘Clad-Gard SA’.

.3 GCP Applied Technologies ‘Ultra’.

.4 Soprema 'Lastobond Shield HT’.

.6 Flexible flashing membrane; standard temperature grade for use at locations where membrane is protected by material with insulating properties:

.1 Description:

.1 Self-adhesive grade rubberized membrane backed by high density polyethylene.

.2 Thickness: 1 mm (40 mils) minimum.

.3 Primer for substrate.

.2 Acceptable Materials:

.1 Henry 'Blueskin Roof RF200'.

.2 GCP Applied Technologies ‘Ice & Water Shield’.

.3 Soprema 'Lastobond Shield’.

2.5 Fabrication

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable SMACNA "Architectural Sheet Metal Manual (Seventh Edition) details and as indicated.

.2 Form pieces in 3048 mm (10 ft) maximum lengths. Make allowance for expansion at joints.

.3 Sealed joints: Form non-expansion but movable joints in metal to accommodate sealant.

.4 Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, and of greater thickness of metal being secured.

.5 Hem exposed edges on underside 12.7 mm (1/2"). Mitre and seal corners with butyl sealant.

.6 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.7 Provide 25.4 mm (1") minimum overlap between bottom of wood blocking or flashing anchorage support and edge of drip or termination of flashing.

.8 Shop fabricate inside and outside corners.

PART 3 - EXECUTION

3.1 Flexible Flashing Underlayment Installation

.1 Apply primer to concrete masonry and precast concrete substrates.

.2 Install in a consecutive weatherboard method starting at bottom or base of wall and working up.

.3 Provide minimum of 50 mm (2") side laps and 75 mm (3") end laps.

.4 Cut to manageable lengths, position membrane for alignment, remove protective poly-film and firmly apply pressure to assure adhesion.

.5 Eliminate wrinkles or gaps, roll entire membrane surface (including seams) with a counter top or “J-roller” to ensure full contact and adhesion.

.6 Seal membrane terminations, heads of mechanical fasteners, masonry tie fasteners, around penetrations, duct work, electrical and other apparatus extending through the air barrier membrane and around the perimeter edge of membrane terminations.

.7 Flashing membrane shall be applied in weatherboard fashion starting at bottom of base of wall and working up, in and around the full perimeter of openings, to provide water tight protection and according to the following procedures:

.1 Apply the first strip horizontally immediately below the sill, cut it sufficiently long to extend past each side of the window, so that it projects even with the vertical jamb flashing to be applied later. Turn sill flashing up 50 mm (2") at ends of sill.

.2 Sill flashing shall overlap wall membrane. Overlap jamb at head flashing membrane in the same manner.

3.2 Roof Flashing Installation

.1 Install sheet metal work in accordance with SMACNA Architectural Sheet Metal Manual - Seventh Edition - 2012.

.2 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.3 Provide watertight flashing installing capable of resisting specified uplift pressures in accordance with roofing specifications, thermally induced movement and exposure to weather.

.4 Provide minimum 10% slope for drainage towards roof at parapet locations, with minimum 2% sloped to drain at remaining flashing locations.

.5 Provide continuous cleats for attachment of flashings at exterior face of wall and fasten at 150 mm (6”) spacing and not less than 2 fasteners per cleat.

.6 Provide radius (3-piece) copings for curved wall condition unless otherwise indicated.

.7 Prefabricate corner copings in 610 mm (24") x 610 mm (24") shop fabricated and connected one pieces sections.

.8 Concealed fastenings and cleats, from view except where exposed flashings are accepted by Contract Administrator prior to installation.

.1 Roof side fastening of copings shall be accomplished using either cleats or exposed colour matched screws with EDPM backed metal washers fastened through oversized holes in coping to allow for thermally induced movement and spaced at maximum spacing of 610 mm (24”) centre to centre and not less than 2 fasteners per section of coping.

.9 Flash joints using S-lock forming tight fit over hook strips/cleats; unless otherwise indicated.

.10 Install surface mounted flared joint true and level, and caulk top of reglet with sealant at reglets.

.11 Insert metal flashings to other materials and flashings to form weather-tight junction.

.12 Provide prefinished metal flashing over equipment curbs which are covered with roofing membrane.

.13 Turn top edge of flashing into recessed reglet or mortar joint where indicated, to minimum depth of 25 mm (1"). Wedge flashing securely into joint. Seal flashing at reglet and cap flashing with sealant.

.14 Expansion provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 3048 mm (10 ft) and provide uniform joint spacing with no joints allowed within 610 mm (24") of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 25.4 mm (1") deep, filled with butyl sealant concealed within joints.

.15 Install flexible flashing membrane in accordance with manufacturer's written installation requirements.

3.3 Installation of Roof Accessories

.1 Incorporate devices to which roofing and flashing may be secured.

.2 Install work to ensure that roofing and flashings will be properly applied to maintain building envelope weather-tight.

3.4 Installation Tolerances

.1 Shim and align sheet metal flashing and trim within installed tolerance of 6 mm in 6 m (1/4 inch in 20 feet) on slope and location lines as indicated and within 3.2 mm (1/8") offset of adjoining faces and of alignment of matching profiles.

3.5 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.1 The work of this section will be inspected and tested in conjunction with inspection and testing of roofing work.

3.6 Adjusting and Cleaning

.1 Remove deposits, stains or protections and wash metals left unpainted and exposed to view as recommended by manufacturer of metal or paint finish.

3.7 Protection

.1 Advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction to ensure that work will be without damage or deterioration other than natural weathering.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Roof hatches.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Show profiles, accessories, locations, and dimensions.

.2 Include details of interface with work of other sections.

.4 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Quality Assurance

.1 Mock-up:

.1 Coordinate with mock-ups specified in Section 07 08 00.

1.4 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 5 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Roof Hatches; Ladder and Ship's Ladder Access

.1 Description: Preassembled, insulated cover and insulated metal curb, welded corner construction, c/w padlock latch, hinge, handle, and other hardware as required.

.2 Cover: Break formed, hollow-metal design with concealed insulation, overlapping flange, and internally reinforced live load to meet building code.

.1 Aluminum: Cover and frame; 2.3 mm (0.09") (11 gauge) aluminum.

.3 Gasket: Extruded EPDM rubber gasket permanently adhered to cover.

.4 Hinges: Heavy-duty pintle hinges with 9.5 mm (3/8") type 316 stainless steel hinge pins.

.5 Latch: Slam latch with interior and exterior turn handles and padlock hasps.

.6 Lift Assistance: Compression spring operators enclosed in telescopic tubes. Automatic hold-open arm with grip handle release.

.7 Hardware:

.1 Aluminum: Engineered composite compression spring tubes. Steel compression springs with electrocoated acrylic finish. Type 316 Stainless steel hinges. All other hardware is zinc plated/chromate sealed.

.8 Sizes:

.1 Child care centre: 1220 mm x 1220 mm (48" x 48").

.2 Recreation centre: as indicated on Drawings.

.9 Safety railing system; safety yellow colour, self-closing gate with latch, model size to fit hatch:

.1 Bilco 'Bil-Guard 2.0 Hatch Safety Railing System'.

.2 Lexcor 'Roof Hatch Safety Railing System'.

.10 Finish:

.1 Aluminum: Mill finish.

.11 Acceptable Materials:

.1 Bilco '50-TB' series.

.2 Lexcor 'R' series.

.3 Substitutions: in accordance with Section 01 25 00.

2.3 Fabrication

.1 Fit joints and junctions between components tightly, to prevent entry of water into component voids and interior of building. Cap open ends of sections exposed to view.

.2 Fabricate work with materials and component sizes, complete with metal gauges, reinforcing, anchors, and fastenings of adequate strength to ensure that it will remain free of warping, buckling, opening of joints and seams, and distortion within limits of intended and specified use. Conceal and weld connections wherever possible.

PART 3 - EXECUTION

3.1 Installation

.1 Install in accordance with manufacturer's written installation requirements.

.2 Incorporate devices to which roofing and flashing may be secured, and install work to ensure that roofing and flashings will be properly installed to maintain weather-tight building.

.3 Verify under work of this section that installed products function properly.

.4 Adjust hardware to function smoothly and without binding and to ensure that components fit in a weather-tight fashion.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Sprayed fire-resistive materials.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 ULC or cUL design number, brand names and descriptive catalogue data of Materials to be used in the work of this section.

.2 Include complete test report in cases where references are not published by testing laboratories, and where authority having jurisdiction has approved significant changes from tested assembly on basis of an engineering study; study calculations shall accompany report.

.3 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified and with approval and training of Material manufacturers.

.2 Materials and applied systems shall have full acceptance by authority having jurisdiction.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 Materials shall be listed in accordance with CAN/ULC S101-14 achieve required fire protection rating.

.2 Materials shall be asbestos free.

.3 Water, bonding agents, binders, accessories, cleaning solvents, aggregates and sealers shall be in accordance with base material manufacturer's recommendation.

.4 Metal lath or non-metallic fibre mesh: as recommended by applied fireproofing manufacturer.

2.3 Mineral-Fibre Fireproofing (Dry-Mix)

.1 Description: Dry-mix spray-applied fire resistive materials (SFRM) consisting of factory mixed dry formulation of Portland cement, inorganic binders combined with sprayed-applied mineral wool, conveyed in a dry state by pneumatic equipment and mixed with water at the nozzle, forming a slurry which is then applied to the substrate.

Acrylic fireproofing adhesive and sealer: Vinyl acrylic copolymer emulsion of fine particle size, films retain high degree of flexibility and elongation.

.2 Acceptable Materials:

.1 Isolatek International 'Cafco Blaze-Shield II / Isolatek Type II'.

.2 Substitutions: in accordance with Section 01 25 00.

PART 3 - EXECUTION

3.1 Preparation

.1 Review locations of exposed/non-exposed fireproofed surfaces with Contract Administrator prior to application.

.2 Coordinate sprayed-applied fireproofing terminations and transitions with intumescent fireproofing system under Section 07 81 23.

.3 Prepare substrate in accordance with the written requirements of the manufacturer of the sprayed fireproofing material to achieve required fire protection.

.4 Mechanically fasten metal lath or non-metallic fibre mesh to painted surfaces to receive applied fireproofing in accordance with manufacturer's recommendations.

.5 Apply medium coat of sealer to fireproofing in surfaces of indicated SFRM to prevent dust particles from becoming airborne.

3.2 Application

.1 Apply sprayed-applied fireproofing in accordance with the written requirements of the manufacturer of the sprayed fireproofing material, and as specified herein and in accordance with listed assembly.

.2 Apply by the contour method in one or more coats of sufficient thickness to achieve the fire ratings as required.

.3 Install the sprayed-applied fireproofing so that any movement of building structure acting alone or together does not tear, rupture, delaminate, puncture or perforate spray-applied fireproofing.

3.3 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00, supplemented as follows:

.1 Independent inspection and testing company will inspect finished installation to verify, at random, densities and minimum thicknesses of sprayed fire resistant materials.

.2 Manufacturer's field review to be in accordance with Section 01 45 00.

3.4 Protection

.1 Protect during installation any adjacent finished surfaces from contamination and damage due to the work under this section.

.2 Protect completed work, vulnerable corners, edges, and surfaces liable to be damaged due to construction activities. Provide wood cover strips and sheet material as required to prevent damage.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Intumescent fire-resistive materials (IFRM) to surfaces of structural steel components required to have fire rated hourly classification, complete with painted finish where exposed.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.2 Coordination:

.1 Primer to be approved by fireproofing manufacturer. Coordinate with Section 05 12 00.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section including, but not limited to:

.1 Brand names and descriptive catalogue data of proposed Materials.

.2 Complete references to tests by UL/ULC or WH that substantiate design to be applied. Test data shall be evaluated or developed under CAN/ULC S101-14 temperature criteria.

.3 Include complete test report in cases where references are not published by testing laboratories, and where authority having jurisdiction has approved significant changes from tested assembly on basis of an engineering study; study calculations shall accompany report.

.1 Submit test reports at least 8 weeks prior to application of materials.

.4 Submit compatibility statement demonstrating compatibility testing of topcoat for each intumescent fireproofing system from intumescent fireproofing manufacturer.

.3 Samples:

.1 Submit 305 mm x 500 mm (12" x 20") samples of full IFRM coating system. Step back each additional coating layer to show range of materials from substrate to finish coat, including colour and texture as applicable.

.4 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit daily log book.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers: Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified and with approval and training of Material manufacturers.

.2 Mock-ups:

.1 Construct typical installations of a circular column and typical column with x-brace including connection details, representative of finished work. Locate at the Site as directed by Contract Administrator as part of final installation.

.2 Do not proceed until samples have been accepted by Contract Administrator and intumescent fireproofing manufacturer.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Carry out the work of this section in accordance with fire test report data, under CAN/ULC S101-14 procedures and as listed by accredited testing agency.

.2 Materials and applied systems shall have full acceptance by authority having jurisdiction.

.3 Fire rated hourly classification of 1 hour minimum, and as indicated.

2.3 Materials

.1 General: Install only Materials as supplied by one manufacturer/supplier for the work of this section.

.2 Intumescent fire-resistive material (IFRM):

.1 Interior grade (water based materials):

.1 Finish:

.1 Architecturally smooth, high quality finish, with no visible texture or imperfections.

.2 Acceptable Materials:

.1 AD Fire Protection System, a Division of Carboline 'A/D Firefilm III'.

.2 Carboline 'A/D Firefilm III' or 'A/D Firefilm IV'.

.3 Cafco 'SprayFilm WB3/Isolatek Type WB3 or WB5/Isolatek Type WB5'.

.4 Hilti Inc. 'Fire Finish CFP-SP WB'.

.5 Substitutions: in accordance with Section 01 25 00.

.3 Topcoat:

.1 Interior grade applications:

.1 Topcoat materials shall be as required for colour coding, aesthetics or additional surface protection, acrylic based, and shall be as recommended by the intumescent fireproofing manufacturer.

.2 Colours and sheen: to later selection by the Contract Administrator from the manufacturer's full range.

.4 Materials shall be listed in accordance with CAN/ULC S101-14.

.5 High temperature or fibreglass mesh: as recommended by intumescent fireproofing manufacturer.

2.4 Coating Thickness

.1 Review Contract Documents to determine necessary coating thicknesses as based upon M/D calculations and as required to conform to building code. Contract Price includes complete systems as required to meet fire ratings.

PART 3 - EXECUTION

3.1 Examination

.1 Examine and verify that surfaces are dry, clean and free from oil, grease, dirt, loose primer, mill scale or other deleterious material that would impair bond.

.2 Verify that all surfaces have been primed with a suitable primer compatible with basecoat to ensure proper bonding.

.3 Examine surfaces to receive the work of this section and proceed only when conditions are satisfactory. Report unsatisfactory conditions promptly.

.4 Verify compatibility of adjacent fireproofing to protect required fire protection to meet the building code.

3.2 Preparation

.1 Confirm locations of surfaces to receive IFRM with Contract Administrator prior to application.

.2 Coordinate IFRM terminations and transitions with sprayed fireproofing system under Section 07 81 00. Where sprayed fireproofing meets intumescent fireproofing provide 100 mm to 150 mm (4" to 6") overlap.

.3 Remove dirt, dust and other deleterious substances from surface to be coated.

.4 Remove and replace accessory objects as required. Do not coat devices thereby exposed.

.5 Apply high temperature or fibreglass mesh in accordance with manufacturer's recommendations.

.6 Mask adjacent surfaces.

.7 Mix materials and Materials in accordance with manufacturer's written requirements.

3.3 Installation

.1 Apply IFRM system in accordance with manufacturer's written requirements and in compliance with listed system design.

.2 Apply IFRM to proper loading thickness to achieve required fire protection rating.

.3 Thoroughly mix IFRM materials before application and applied without cutting or admixture of any kind except as may be directed by the manufacturer. Apply IFRM evenly, in full coats free from application marks, sags, runs, crawls and other defects. Finish shall be uniform in sheen, colour and texture.

.4 Finished application shall be architecturally smooth; rough textures and orange peel finish are not acceptable.

3.4 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00, supplemented as follows:

.1 Maintain daily log book, including:

.1 Temperature conditions.

.2 Humidity conditions.

.3 Substrate conditions.

.4 Heating apparatus used to maintain temperature conditions (as applicable).

.5 Areas of the Work completed.

.2 Manufacturer's field review to be in accordance with Section 01 45 00.

3.5 Adjusting and Cleaning

.1 Clean and make good to Contract Administrator*'s* acceptance, surfaces soiled or otherwise damaged in connection with work of this section. Pay cost of replacing finishes, materials and Materials that cannot be satisfactorily cleaned.

.2 Upon completion of the work of this section, remove all debris, equipment and excess material resulting from work of this section from the Site.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Materials installed in joints to restrict the spread of fire and smoke.

.1 Joints in or between fire-resistance-rated constructions.

.2 Perimeter fire barrier systems between fire-rated floor/roof and non-rated exterior wall assembly.

.1 Coordinate perimeter fire barrier system installation requirements with work of curtain wall assemblies.

.2 Section excludes:

.1 Firestopping and smoke seals, for mechanical, electrical and communications penetrations of fire resistant assemblies, and firestopping and smoke seals within their respective assemblies. Refer to Divisions 21, 22, and 23 and Divisions 26, 27, and 28.

1.2 Administrative Requirements

.1 Coordination:

.1 Coordinate joint firestopping and smoke seal work with requirements specified under “Project Firestopping Manual and Coordination” heading in Section 01 33 00.

.2 Coordinate with other sections to assure that pipes, conduit, cable, and other items that penetrate fire rated construction, have been permanently installed prior to installation of firestop assemblies.

.3 Schedule the Work to assure that penetrations and other construction that conceals penetrations are not erected prior to the installation of firestop and smoke seals.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Representatives for mechanical and electrical work and independent inspection and testing company shall attend pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.2 Material data sheets shall include the following information:

.1 Data and installation instructions for Materials providing descriptions sufficient for identification at the Site.

.2 Materials list of Materials proposed for use in the work of this section; complying with listed systems designs.

.3 Listing agency's detailed drawing showing joint assemblies and firestopping materials, identified with listing agency's name and number or designation, fire rating achieved, and date of listing.

.4 Submit fire resistance rating test listings for firestopping and smoke seal systems.

.3 Shop drawings:

.1 Submit drawings indicating fire resistance rated assembly number, required temperature, hose stream, and flame rating, material thicknesses, installation methods and materials of firestopping and smoke seals, primers, supports, damming materials as applicable, reinforcements, anchorages, fastenings and methods of installation for each condition to be encountered.

.2 Designate on shop drawings static and dynamic joint systems, relative positions, expansion and control joints in rated slabs and walls, and firestopping details.

.3 Engineered shop drawings; for engineering judgements:

.1 Where project conditions require modification to an accredited third party testing agency's listed system design to address a particular firestopping condition that is not covered by a listed system, submit engineered shop drawings detailing the modifications to the listed system design as an engineering judgment or equivalent fire-resistance-rated assembly, for each project location and condition.

.2 Submit the manufacturer's engineering judgment identification number and shop drawing details prepared by a professional engineer. The engineering judgment submittal shall include both project name, project location, and Subcontractor’s name who will install firestop system as described in engineering judgement shop drawings.

.3 Provide complete details of specific application of listed system and its modifications upon which the engineered judgement is based upon.

.4 Manufacturers’ instructions:

.1 Manufacturer of Materials proposed for use in work of this section shall prepare firestopping manual scheduling products to be used for each assembly and installation required in the Work.

.1 Coordinate with project firestopping manual specified under Section 01 33 00.

.2 Manual shall include manufacturer’s Material data sheets as specified under “Material data sheets” heading in Section 07 84 00.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Submit the following for inclusion in the operation and maintenance manual:

.1 Letter signed by firestopping and smoke seal manufacturer on manufacturer's letterhead verifying that installed firestopping and smoke seal Materials are suitable for the use indicated and comply with requirements of the Contract Documents.

.2 Letter signed by firestopping and smoke seal installer on installer's letterhead verifying that joint firestopping system installations are completed and that installations comply with listed systems designs and requirements of the Contract Documents.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers: Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified and with approval, training and certification of Material manufacturers.

.1 Submit proof of manufacturer's installer certification for each installer of firestopping and smoke sealant systems.

.1 Manufacturer's willingness to sell its firestopping Materials to the Contractor or to an installer engaged by the Contractor does not in itself confer qualification on the buyer.

.2 Applicator shall designate a single individual as project foreperson who shall be present at the Site at all times throughout the work of this section when the work of this section is being performed.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 Manufacturers

.1 General: Manufacturers of firestopping and smoke seal system Materials and installation specialists for the work of this section are limited to applicable assemblies as required for the Work and having listing mark on packaging.

.2 Subject to compliance with requirements, provide products by one of the following:

.1 3M Canada Inc.

.2 Hilti Canada Corp.

.3 NUCO Inc.

.4 STI Firestop.

.5 Tremco Commercial Sealants & Waterproofing.

2.2 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.3 Performance/Design Requirements

.1 Single source responsibility:

.1 Provide Materials from one manufacturer for the work of this section, including accessory Materials.

.1 Where manufacturer does not manufacture or supply required accessory Materials, any such accessory Materials supplied for use in the Work shall have approval from manufacturer for use as part of the final warrantied installation.

.2 Firestop and smoke sealant systems shall consist of material, or combination of materials installed to retain integrity of fire-rated construction by effectively impeding spread of flame, smoke, and/or hot gasses through perimeter joint or gaps, construction joints, or at perimeter fire containment in or adjacent to fire-rated barriers.

.3 Smoke sealants applied over firestopping materials or combination smoke seal/firestop seal material shall form air tight barriers to prevent passage of gas and smoke.

.4 Fire-resistance rating of firestopping system shall be equivalent to rating of adjacent floor, wall or other fire separation assembly.

.5 Firestopping system at fire rated assemblies with assembly STC rating requirements shall provide STC rating equal to STC rating of fire rated assembly.

.6 Confirm locations of exposed/non-exposed firestopping/smoke seal surfaces with Contract Administrator prior to application.

.7 Provide movement capability at movement joints in accordance with design requirements for movement joint.

.8 Head-of-wall joints; with dynamic designation:

.1 Joint assemblies shall permit vertical movement allowing wall to move independent of structure due to forces including, but not limited to, live loads, dead loads, thermal expansion/contraction, and wind sway. Such movement shall not damage the wall assembly or its fire protection components.

.1 Provide head-of-wall joints with dynamic designation.

.9 Regulatory requirements:

.1 Joint firestop systems shall be listed in accordance with CAN/ULC-S115-11 and shall achieve required fire resistance rating in accordance with building code.

.2 Joint firestop systems located between a horizontal floor and exterior wall shall be tested in accordance with ASTM E2307-15b and have a fire resistance rating no less than the fire-resistance rating of the horizontal fire separation.

.3 Proposed firestopping and smoke seal materials and methods shall conform to applicable governing codes having local jurisdiction.

2.4 Materials

.1 Firestopping and smoke seal systems shall conform to the following:

.1 Have a VOC limit of 250 g/L maximum, unless otherwise specified.

.2 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gasses in compliance with requirements of CAN/ULC-S115-11 and not to exceed opening sizes for which they are intended.

.3 Provide firestopping materials and systems with FT fire-resistance rating not less than the fire-resistance rating of applicable adjacent assembly.

.4 Listed in accordance with CAN/ULC-S115-11.

.5 Use only joint firestop systems that have been tested by an accredited third party testing agency for specific fire-rated construction conditions conforming to construction assembly type, joint type and fire-rating requirements for each separate instance.

.1 Where there is no specific third party tested and classified firestop system for a particular firestop configuration, submit engineered shop drawings.

.6 For joints in fire-separations, provide listed systems designs for the joint firestop and smoke seal systems as required by building code to maintain the integrity of the fire separations.

.7 Materials shall be compatible with abutting dissimilar membranes, architectural coatings, finishes at floors, walls and ceilings. Check with requirements of Contract Documents and manufacturer of selected materials being installed.

.2 Smoke sealants for overhead and vertical joints shall be non-sagging; sealants for floors shall be self-levelling.

.3 Smoke seal sealant colour at exposed locations: Grey.

.4 Joint firestopping and smoke seal for head-of-wall joints at metal decking:

.1 Firestopping: Trapezoidal shaped firestop thermal material shaped to match metal deck profile for head-of-wall joints at metal deck locations.

.2 Smoke sealant: Smoke seal firestop surfaces with listed smoke sealant by spraying, brushing, or troweling material in accordance with listed system design.

PART 3 - EXECUTION

3.1 Preparation

.1 Examine sizes, anticipated movement and conditions to establish correct thickness and installation of back-up materials.

.2 Prepare surfaces in accordance with manufacturer's written specifications and to requirements of listed system designs.

3.2 Installation

.1 Install joint firestopping and smoke seal systems in accordance with manufacturer's written requirements and in compliance with listed system designs. Products and installation requirements must comply with listed system designs.

.2 For materials that will remain exposed after completing the Work, finish to achieve smooth, uniform surfaces. Tool or trowel exposed surfaces.

.3 Notify Contract Administrator when random completed installations are ready for review, as directed by Contract Administrator, prior to concealing or enclosing firestopping and as applicable, smoke seals.

.4 Protect materials from damage on surfaces subjected to traffic.

3.3 Identification and Documentation

.1 Provide documentation for each joint firestop system application addressed. This documentation is to identify each joint location on the entire Project.

.2 Documentation for installed joint firestop systems is to include:

.1 Sequential location number.

.2 Project name.

.3 Date of installation.

.4 Detailed description of joint firestop system location.

.5 Listed firestop system design number or engineered judgment number.

.6 Type of joint.

.7 Width of joint.

.8 Overall length of joint.

.9 Number of sides addressed.

.10 Hourly rating of firestop joint system to be achieved.

.11 Installers name.

3.4 Field Quality Control

.1 Conduct quality control to be in accordance with Section 01 45 00.

.1 Field tests and inspections:

.1 Examine completed firestop joint installations to ensure proper installation before concealing or enclosing areas. Keep areas of work accessible until inspections are completed.

.2 Inspection consultant to review installation of the work of this section and to perform random tests to verify its completion in accordance with the requirements of the Contract Documents.

.3 Give at least 48 hours notice before operations commence, and arrange for a pre-job conference with Contractor, installer, independent inspection and testing company, manufacturer, and Contract Administrator present.

.4 Independent inspection and testing company shall examine installed firestopping in accordance with ASTM E2174-20a and ASTM E2393-20a. Independent inspection and testing company shall examine firestopping and shall determine, in general, that firestopping has been installed in accordance with requirements of the Contract Documents and in compliance with each listed firestop system design.

.5 Representatives of the manufacturer(s) shall have access to the Work. Contractor shall provide assistance and facilities for such access in order that the manufacturer(s) representative(s) may properly perform its function.

.2 Manufacturer’s field review to be in accordance with Section 01 45 00.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Joint sealants – exterior building envelope locations.

.2 Joint sealants – interior locations.

.2 Section excludes:

.1 Roofing system sealants.

.2 Tiling control joint sealants.

.3 Glazing system assembly sealants.

.4 Fluid-applied flooring sealants.

.5 Mechanical and electrical sealants.

.6 Acoustic sealants.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

.2 The following items shall be addressed at the pre-installation meeting:

.1 Analysis of the work and weather conditions.

.2 Shape factor of the joint.

.3 Recommendations for priming joints.

.4 Inspection of surfaces and joints.

.5 Compatibility of materials.

.6 Backing materials.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.2 Submit manufacturer's and Material name for each sealant which will be used in the Work prior to commencing the Work.

.3 Samples:

.1 Submit "wet sample" sealant colour samples for each sealant Material and colour.

.4 Test and evaluation reports:

.1 Test sealant in contact with samples of materials to be sealed to verify adhesion will be achieved in accordance with Field Quality Control paragraphs in Section 07 92 00, and no staining of the material will result. Prepare sample joints at the Site of each type of sealant for each joint condition.

.1 Submit test results to Contract Administrator prior to application of sealants.

.2 Test sealant in contact with samples of porous materials to be sealed to ensure that no staining of the material will result in accordance with ASTM C1248-22.

.1 Submit test results to Contract Administrator prior to application of sealants.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.1 Include manufacturer's warranties.

.2 Maintenance instructions:

.1 Submit maintenance instructions for all items for incorporation into the operation and maintenance manuals.

1.5 Quality Assurance

.1 Qualifications:

.1 Subcontractor:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

.2 Installer to comply with quality assurance articles referenced in ASTM C1193-16 for installation of joint sealants.

.2 Mock-up:

.1 Coordinate with mock-ups specified in Section 07 08 00.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranties:For silicone sealants applied to porous substrates, provide Material non-stain sealant warranty for period of 20 years, against migrating, bleeding into, or staining abutting materials.

.2 For exterior exposed silicone sealants, provide 20 year Product material warranty.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Interior sealants shall have a VOC limit of 50 g/L maximum, unless otherwise specified, and comply with South Coast Air Quality Management District (SCAQMD) Rule 1168, Adhesive and Sealant Applications.

.2 Joint sealants:

.1 Shall perform as air tight and water-tight joints.

.2 Defects shall include, but are not limited to:

.1 Staining from abutting materials or filler.

.2 Migrating, bleeding into, or staining abutting materials.

.3 Unsightly surface deformation.

.4 Excessive colour change, chalking, or dust pick-up.

.5 Failing adhesively or cohesively where maximum elongation is less than 25% of designed width of exposed joints.

.6 Hardening to more than 25% over specified hardness.

.3 For architectural precast concrete installations: Design and install joint seals (materials and profiles) in accordance with CPCI – Architectural Precast Concrete Walls Best Practice Guide (2017), requirements of CSA A440.6-20, requirements of ASTM C1193 when liquid-applied sealants are used, sealant manufacturer's written requirements, and in accordance with Section 07 92 00.

2.3 Sealants

.1 General:

.1 Single source responsibility: Obtain joint sealant from a single manufacturer for each joint sealant type.

.2 Colours: Sealant colours shall match colours of adjacent materials, as selected and approved by Contract Administrator.

.1 Colours: shall be selected from manufacturer's full range of colours.

.3 In accordance with ASTM C920-18 and other requirements indicated for each liquid-applied chemically curing sealant, including those referencing ASTM C920-18 classifications for type, grade, class, and uses.

.4 For sealants to be applied to porous substrates:

.1 Provide products that have undergone testing in accordance with ASTM C1248-22 and have not stained porous joint substrates indicated for Work.

.5 Sealant supplied shall not exude any material(s) which travel into adjacent materials, or travel onto surfaces of adjacent materials; causing damage, or attracting soiling, which becomes apparent during the service life of the building.

.2 Exterior sealants; joints in vertical and overhead surfaces:

.1 Silicone sealant; high performance; 100% inorganic type:

.1 Single-component, non-sag, low to medium modulus non-bleed, high-performance silicone joint sealant, in accordance with the following: ASTM C920-18, Type S, Grade NS, Class 50 or greater.

.2 Provide low or medium modulus sealants as recommended by exterior wall cladding manufacturer.

.3 Acceptable Materials:

.1 Low modulus:

.1 DOWSIL '790'.

.2 Momentive 'SCS2700 Silpruf LM.

.3 Sika 'Sikasil WS-290'.

.4 Tremco, Inc. 'Spectrem 1'.

.2 Medium modulus:

.1 DOWSIL '795'.

.2 Momentive 'SCS 2000 Silpruf'.

.3 Sika 'Sikasil WS-295'.

.4 Tremco, Inc 'Spectrem 2'.

.3 Exterior general sealants; horizontal trafficable joints:

.1 High performance sealants:

.1 Silicone low modulus pour grade traffic sealant in accordance with the following: ASTM C920-18, Type SL, Grade P, Class 25.

.2 Acceptable Materials:

.1 DOWSIL '890-SL'.

.2 DOWSIL 'SL Parking Structure Sealant'.

.3 Sika ‘Sikasil-728 SL’.

.4 Tremco, Inc. ‘Spectrem 900SL’.

.4 Interior general sealants:

.1 VOC limit: Maximum 50 g/L, unless otherwise indicated.

.2 Interior sealant; at joints with painted gypsum board: one-component paintable acrylic in accordance with ASTM C834-17Type OP; or polyurethane in accordance with ASTM C920-18 Type S, Grade NS, Class 35.

.1 Acceptable Materials:

.1 Acrylic sealants:

.1 Tremco, Inc. ‘Tremflex 834’.

.2 Polyurethane sealants:

.1 Sika ‘Sikaflex 1A’.

.3 Substitutions: in accordance with Section 01 25 00.

.3 Interior sealant; gap filler: at movement paintable joints in vertical surfaces: One-component polyurethane sealant in accordance with the following: ASTM C920-18, Type M or S, Grade NS, Class 25.

.1 Acceptable Materials:

.1 Sika ‘Sikaflex 15LM’.

.2 Substitutions: in accordance with Section 01 25 00.

.4 Interior sealant; at movement joints in vertical surfaces: one-component polyurethane sealant in accordance with the following: ASTM C920-18, Type M or S, Grade NS, Class 25.

.1 Acceptable Materials:

.1 Sika ‘Sikaflex NP 1’.

.2 Sika ‘Sikaflex 15LM’.

.3 Tremco, Inc. ‘Dymonic 100’.

.4 Substitutions: in accordance with Section 01 25 00.

.5 Interior sealant; at vertical and trafficable movement joints: one-component low modulus silicone sealant in accordance with the following: ASTM C920-18, Type S, Grade NS, Class 100/50.

.1 Acceptable Materials:

.1 DOWSIL ‘790’.

.2 Momentive ‘Silpruf LM SCS2700’.

.3 Sika ‘Sikasil WS-290’.

.4 Tremco, Inc. ‘Spectrem 1’.

.6 Interior sealant, mildew resistant one part silicone sealant in accordance with the following: ASTM C920-18, Type S, Grade NS, Class 25.

.1 Acceptable Materials:

.1 DOWSIL ‘786’.

.2 Momentive ‘Sanitary SCS1700 Sealant’.

.3 Sika ‘Sikasil GP’.

.4 Tremco, Inc. ‘Tremsil 200’.

2.4 Accessories

.1 General: Provide joint sealants, primers, backings, and fillers that are compatible with one another and with joint substrates and other sealants or joint fillers specified and approved for applications indicated under joint sealant scheduled and under conditions of service and application as demonstrated by joint sealant manufacturer based on proven test results and field experience. When incompatible, inform Contract Administrator and change to compatible type acceptable to Contract Administrator.

.2 Cylindrical sealant backings (backer rods): Provide joint backings that meet ASTM C1330-18, sized 25 percent or greater than joint opening with proper density to control sealant depth and profile. Follow joint sealant manufacturer’s recommendations with backing selections for optimum joint sealant performance, in accordance with the following schedule:

.1 Use ASTM C1330-18 Type O (open-cell polyurethane), or Type B (non-absorbent bi-cellular backing materials with surface skin) unless otherwise indicated. Use Type B for exterior applications, vertical joints; round shape for open joints and triangular shape for angular joints.

.2 Use ASTM C1330-18 Type C closed cell foam for horizontal joints.

.3 Bond-breaker tape: Polyethylene tape or other approved plastic tape as recommended by joint sealant manufacturer to prevent 3-sided joint adhesion to rigid, inflexible joint fillers or joint surfaces at back of joint where such adhesion would restrict proper sealant movement or result in sealant failure.

.4 Masking tape: Non-staining, non-absorbent and compatible with joint sealants and adjacent surfaces.

.5 Sealant primers: Use primers only as recommended by sealant manufacturer where required to enhance adhesion of sealant to specific joint substrates indicated and as determined for use from pre-construction mock-up testing. Select primers in consultation with sealant manufacturer and manufacturer of substrate material which do not have a detrimental effect on sealant adhesion or in-service performance.

.6 Cleaners for nonporous surfaces:

.1 Provide non-staining, chemical cleaners of type which are acceptable to manufacturer of sealant and sealant backing material, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

.2 Provide cleaner conditioner required for glass and glazed surfaces as recommended by sealant manufacturer.

PART 3 - EXECUTION

3.1 Manufacturer's Recommendations

.1 Unless specified otherwise herein, comply with the recommendations and directions of the manufacturer whose materials are being used in the work of this section.

3.2 Preparation

.1 Protect adjacent work areas and finished surfaces from damage during joint sealant installation.

.2 Clean and prepare joint surfaces and substrates in accordance with ASTM C1193-16 and outlined by joint sealant manufacturer's written requirements.

.3 Prepare rusting or scaling surfaces using abrasive cleaning methods as recommended by joint sealant manufacturer prior to joint sealant installation. Remove and neutralize efflorescence, mould, mildew and algae prior to joint sealant installation.

.4 Prepare finish-coated surfaces per joint sealant manufacturer's specific recommendations.

.5 Test materials for indications of staining or poor adhesion before any sealing is commenced. Submit reports in writing to Contract Administrator of results.

.6 Do not proceed with installation of joint sealants under the following conditions:

.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer, or are below 5°C (40°F).

.2 When joint substrates are wet.

.3 Where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.4 Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

3.3 Masking

.1 Where necessary to prevent contamination or marring surfaces of adjacent materials, mask areas adjacent to joints with masking tape prior to priming or sealing application. Remove tape immediately after joint has been completed and an initial set achieved.

3.4 Installation

.1 Install in accordance with joint sealant manufacturer's installation written requirements for products, primers and applications indicated unless more stringent project-specific instructions or requirements apply.

.2 Apply joint sealants for continuous waterproof sealant joint protection. Lap vertical joints over horizontal joints as recommended by sealant manufacturer. Comply with installation recommendations in ASTM C1193-16 for use of joint sealants as applicable to each specific sealant installation.

.3 Install sealant primers only when recommended by sealant manufacturer and demonstrated at pre-construction tests after joint surface preparation has been completed and when surfaces are verified as clean and dry. Allow any primer installation to completely dry or cure prior to installation of backing or joint sealants. Primer is mandatory for gun applied sealants.

.4 Install joint sealants using proven techniques that comply with the following and in proper sequence with installation of primers and backings.

.1 Using proper joint sealant dispensing equipment, place sealants by pushing sealant beads into opening to fully wet-out joint sealant substrates. Fill sealant joint opening to full and proper configuration.

.2 Provide uniform cross-sectional shapes and depths in relation to joint width for optimum sealant movement capability per joint sealant manufacturer's written requirements.

.5 Joint sealant tooling is required for non-sag joint sealant installations. Immediately after placing fresh sealants and before skinning or curing begins, tool sealants using metal spatulas designed for this purpose in accordance with manufacturer's recommendations. Provide a smooth, uniform sealant finish, eliminating air pockets and ensuring good contact for optimum sealant adhesion within each side of the joint opening.

.1 Provide concave joint configuration as indicated per figure 5-A in ASTM C1193-16 unless otherwise indicated.

.2 Use tooling agents that are approved in writing by sealant manufacturer and that do not discolour sealants or adjacent surfaces.

.3 Remove excess sealant from surfaces adjacent to joint openings using metal spatula, promptly cleaning any sealant residue from adjacent finished surfaces. Remove masking after joint sealant is installed.

.6 Allow single-component sealants to fully cure before adhesion testing is performed as recommended by joint sealant manufacturer as outlined in Field Quality Control paragraphs in Section 07 92 00.

.7 Match approved sealant mock-up for colour, finish and overall aesthetics. Remove, refinish or re-install work not in compliance with the Contract Documents.

.8 When surfaces of adjacent materials are to be painted, perform sealant work before these surfaces are painted.

.9 Check form release agent used on concrete for compatibility with primer and sealant. If they are incompatible inform Contract Administrator and change primer and sealant to compatible type, or clean concrete to sealant manufacturer's acceptance.

.10 Install joint backing material, filler strips, gaskets, bond breakers and similar type material of comparable performance characteristics. Install bond breaker tape or packing over asphalt impregnated fibre board as recommended by sealant manufacturer.

.11 Where joints are 12.7 mm (1/2") or deeper, insert backing material in continuous uniform compression with setback from finished face of adjoining materials equal to required depth of sealant (width/depth ratio) as specified herein.

.12 On horizontal traffic surfaces, support joint filler against vertical movement which might result from traffic loads, including foot traffic.

.13 Install bond breaker tape in bottom of joints in lieu of sealant backing where proper depth cannot be obtained when backing is installed.

.14 Maintain correct sealant depth. Sealant depth shall be 1/2 the width of the joint, maximum depth shall be 12.7 mm (1/2"), minimum depth shall be 6 mm (1/4"). Comply with manufacturer's written recommendations.

.15 Fillet bead sealant joints to be sized to provide proper contact area with substrates, in accordance with manufacturer's written recommendations.

.16 Apply sealants using pressure-operated guns fitted with suitable nozzles in accordance with manufacturer's directions. Apply sealants in such manner as to ensure good adhesion to sides of joints and to completely fill voids in joints.

.17 Apply sealants so that surfaces of joints are smooth, full bead, free from ridges, wrinkles, sags, air pockets and embedded impurities. Tool sealant surfaces to produce a smooth surface.

.18 Install sealant with exterior face of sealant set back 10 mm (3/8") from face of adjacent materials at building movement joints, unless otherwise indicated.

.19 Do not apply sealants to areas where installation of paints, coatings or flooring is in progress. Apply sealants after such work is complete and fully cured.

3.5 Sealant Installation at Architectural Precast Concrete

.1 Install joint seals in accordance with CPCI – Architectural Precast Concrete Walls Best Practice Guide (2017), requirements of CSA A440.6-20, ASTM C1193 when liquid-applied sealants are used, reviewed show drawings, sealant manufacturer’s written requirements, and in accordance with Section 07 92 00.

.2 Seal exterior joints, with rainscreen application of sealant specified for joints in vertical surfaces at interior and exterior side of joint to the following locations including:

.1 Precast concrete to precast concrete.

.2 Precast concrete to concrete.

.3 False joints in precast concrete face.

.3 Provide rain screen (two stage joint sealants) application, with the weather sealant near the exterior face of the precast, and the air/vapour barrier sealant located as follows:

.1 Install exterior weather sealant to shed water from the precast panel joint and locate back from the face of the panel near the exterior face of the precast.

.1 Provide additional transverse sealant application at parapet conditions where roofing/flashing system is not indicated to cover top of precast parapet.

.2 Install interior air/vapour barrier sealant to provide an unbroken continuous barrier to differential air pressure between interior and exterior of building and shall be located as follows:

.1 Single wythe precast panels: Locate close to the interior face of the precast panel.

.2 Double wythe insulated precast panels: Locate close to the exterior face of inside wythe of the precast panel at the back face of the insulation.

.3 The air cavity between the precast panel joints shall be vented (air pressure) and drained (water) to the exterior of building envelope; through the installation of vent/drainage holes by leaving gap in weather sealant of 25 mm (1") minimum by the width of sealant joint located at precast panel joints above openings (at underside), at bottoms of precast areas (at underside), and at regularly spaced intervals along the height of vertical precast joints near the junction of horizontal and vertical joints.

.4 Provide positive drainage with transverse sealant flashing to direct water from air cavity between the precast panel joints to exterior.

.4 Prepare and prime precast concrete as directed by sealant manufacturer.

.5 Coordinate with the other Subcontractors responsible for the adjacent building envelope to ensure a continuous air barrier is installed to building envelope.

3.6 Exterior Sealant Schedule

.1 Include in work of this section joint sealants in exterior assemblies to seal open joints in surfaces exposed to view, and to make building weather-tight, as indicated, and as otherwise specified, except where specified under the work of other sections.

.2 Exterior sealant work is part of the work of this section. Install sealant to:

.1 Perimeters of exterior openings where frames/glazing meet exterior facade of building.

.2 Movement and control joints in exterior surfaces of insitu concrete and masonry.

.3 Exterior joints between masonry and insitu concrete.

.4 Exterior joints in horizontal wearing surfaces.

.5 Perimeters of louvres.

.6 Perimeters of mechanical and electrical penetrations including but not limited to outlets and electrical boxes.

3.7 Interior Sealant Schedule

.1 Include in work of this section sealants to seal open joints in surfaces exposed to view, and to make building weather-tight and air-tight, as applicable, as indicated, and as otherwise specified, except where specified under the work of other sections.

.2 Install sealant to:

.1 Movement and control joints on exposed insitu concrete walls.

.2 Interior control and expansion joints in floor and wall surfaces.

.3 Raked out joints at junctions of masonry with concrete walls and columns, and at intersection of masonry walls and partitions where joint reinforcement is installed.

.4 Perimeters of exterior and interior door and window frames.

.5 Joints at tops of non-load bearing masonry walls at the underside of insitu concrete.

.6 Exposed interior control joints in gypsum board.

.7 Millwork junctions with walls.

.3 Mildew resistant sealant:

.1 Perimeter joints of wet fixtures such as:

.1 Urinals.

.2 Water closets.

.3 Janitor sinks.

.4 Showers.

.2 Wall tile joints, tile to tile at shower corners. Gap between tile backer board and edge of shower base.

.3 Counter/wall junctions at countertops.

.4 At wet areas not listed above.

.5 At resilient flooring and resilient base.

3.8 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.1 Inspection and testing; for exterior sealants only:

.1 Coordinate with inspection and testing as specified in Section 07 08 00.

.2 Field-adhesion testing: Installer to keep daily log of sealant installation recording self-performed field-adhesion test at each elevation of the project and as follows:

.1 Document and perform field adhesion testing in accordance with manufacturer's recommended field-adhesion requirements and submit written reports co-signed by sealant manufacturer's representative. Coordinate with Section 01 45 00.

.2 Perform 5 field adhesion tests for the first 300 m (1000 lineal feet) and one test in each 300 m (1000 lineal feet) of sealant joint length thereafter. One (1) test per floor height and per elevation is also recommended. When the sealant is used to weatherseal between 2 dissimilar substrates, the sealant adhesion to each side of the joint should be individually tested.

.3 Field test joint sealants in accordance with ASTM C1521-19(2020) Destructive Procedure (Method A) and in compliance with manufacturer's specific recommendations.

.4 Evaluation: In compliance with joint sealant manufacturer, joint sealants tested and not indicating adhesive failure within the substrates are considered satisfactory results. For joint sealants that fail to adhere to the substrate, clean, re-install and then re-test until satisfactory results are obtained.

3.9 Adjusting and Cleaning

.1 Remove droppings and clean off excess sealant or sealant residue adjacent to sealant joint installations as the work progresses by methods approved by joint sealant manufacturer before material achieves initial set.

.2 Do not damage adjacent surfaces with harmful removal techniques and protect finished surfaces beyond those that have been masked.

.3 Remove and replace damaged joint sealants.

.4 Remove temporary coverings and masking protection from adjacent work areas upon completion.

3.10 Protection

.1 Protect installed sealants during and after final curing from damage resulting during construction.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Exterior expansion joint seals.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.2 Coordination:

.1 Coordinate interface, transition, and compatibility of expansion joints specified in Sections 07 27 00 and 07 52 16.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Submit engineered shop drawings.

.2 Include large-scale details of members and materials, of anchorage devices where required, dimensions including field measurements taken of locations to receive expansion joint cover assemblies, thicknesses, description of materials, metal finishing specifications and all other pertinent information.

.3 Indicate how expansion joint covers and expansion joint membrane systems are tied into the adjacent envelope enclosure systems, noting the continuity in the air / vapour barrier. Include transition details between roof to wall, and above grade wall to below grade wall.

.4 Submit plans indicating intermediate joint/splice locations and transition locations.

.4 Samples:

.1 Submit 305 mm (12") long sample of each type of expansion joint assembly. Include 1 expansion joint formed corner, and 1 typical butt joint.

.5 Test reports:

.1 Submit material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of fire-rated expansion joint assemblies with requirements indicated.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Maintenance instructions:

.1 Submit maintenance instructions for all items for incorporation into the operation and maintenance manuals.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers: Shall have 5 years' experience, minimum, in the application of the Materials, systems, and assemblies specified.

.2 Mock-up:

.1 Coordinate with mock-ups specified in Section 07 08 00.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 Manufacturer

.1 Acceptable manufacturers:

.1 Construction Specialties.

.2 InPro Jointmaster Engineered Metal Products.

.3 Sika.

.4 Willseal by Tremco.

2.2 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.3 Performance/Design Requirements

.1 Joint movement:

.1 Design expansion joint covers to permit unrestricted lateral movement of up to plus or minus 50% of joint width. Expansion joints shall be designed and installed to maintain watertight joints.

.2 Loading characteristics:

.1 Standard floor covers: Design to withstand a minimum load of 227 kg (500 lb) without damage or permanent deformation.

.2 Extruded aluminum wall and ceiling joint covers: Design to withstand a minimum impact load of 22.5 m/oz (75 ft/lb) without damage or permanent deformation. Tested in accordance with applicable provisions of ASTM F476-14.

2.4 Acceptable Materials

.1 Exterior expansion joint covers:

.1 Description: Pre-compressed watertight foam joint to suit joint width.

.2 Acceptable manufacturers:

.1 Sika Emseal.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Colour to later selection by Contract Administrator.

2.5 Materials

.1 Provide extruded aluminum joint systems of type and size specified herein. Aluminum shall be Alloy 6063-T5.

.2 Provide strippable protective coatings over surfaces of joints to be left exposed. Surface in contact with concrete shall receive 1 shop coat of zinc chromate primer.

.3 Non shrink grout: Sika 'Sikagrout 212'.

.4 The fire rated stop shall be tested in accordance with CAN/ULC-S115-11.

.5 Accessories: Manufacturer's standard anchors, fasteners, set screws, spacers, flexible vapour seals and filler materials, drain tubes, adhesive and other accessories compatible with material in contact, as indicated or required for complete installation for the purpose intended.

2.6 Fabrication - Expansion Joint Covers

.1 Check actual locations of walls and other construction to which work must fit, by accurate field measurements before fabrication. Show recorded measurements on shop drawings.

.2 Expansion joint assemblies shall be fabricated in maximum available lengths to minimize joints.

PART 3- EXECUTION

3.1 Examination

.1 Prior to commencement of the work of this section, examine structure and substrates for tolerances in dimension and any condition affecting the work under this section. Inform Contract Administrator in writing of unacceptable existing work and conditions.

.2 Commencement of installation of work of this section shall be construed as acceptance of existing work and conditions and no other claims based on same will be entertained.

3.2 Installation - Expansion Joint Covers

.1 Install expansion joint cover assemblies in accordance with manufacturer's written specifications.

.2 Where fastenings or anchors have to be built in by other trades, supply same with necessary templates, instructions, and supervision to ensure satisfactory installation. Supply metal anchoring devices.

.3 Provide manufacturer’s standard anchors, fasteners, set screws, spacers, flexible vapour seals filler materials, adhesive and other accessories compatible with material in contact, as indicated or required for complete installation for the work of this section.

.4 Accurately set joints to be flush with finished materials. Set expansion joint on level bed of elastomeric grout. Shimming of expansion joints not acceptable.

.5 Apply elastomeric grout around flanges and anchors as applicable.

.6 Backpaint aluminum surfaces in contact with cement, concrete, masonry, or dissimilar metals with heavy coat of non-staining alkali resistant bituminous paint.

3.3 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.2 Manufacturer’s field review to be in accordance with Section 01 45 00.

END OF SECTION

PART 1 – GENERAL

1.1 SECTION INCLUDES

.1 This section includes labour and materials required to complete conformance testing and reporting of openings.

1.2 RELATED SECTIONS

.1 Section 08 11 13 – Steel Doors and Frames

.2 Section 08 42 29 – Automatic Sliding Entrance Doors

.3 Section 08 44 00 – Aluminum Framed Glazing Systems

.4 Section 08 54 13 – Fiberglass Windows

.5 Section 08 80 00 – Glass and Glazing

.6 Section 08 91 19 – Louvres

1.3 MEASUREMENT AND PAYMENT

.1 No measurement will be made under this section.

.2 Building Envelope Testing; by Building Envelope Commissioning Authority, on behalf of The City.

.3 Co-ordinate visual review and testing frequency and locations with Building Envelope Commissioning Authority to facilitate review of multiple distinct building envelope elements and components during the same visit.

.4 Costs incurred for additional testing for items not meeting the specifications including costs for transportation and for required modifications to be the responsibility of the Contractor.

1.4 REFERENCES

.1 American Architectural Manufacturer's Association (AAMA):

.1 AAMA 501.1-17 Standard Test Method for Water Penetration of Windows, Curtain Walls, and Doors Using Dynamic Pressure.

.2 American Society for Testing and Materials (ASTM):

.1 ASTM E783-02(2018) Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.

.2 ASTM E1105-15 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference.

.3 ASTM E1186-17 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.

.3 Canadian Standards Association (CSA International):

.1 AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights.

.2 CSA A440SI-09 - Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights.

1.5 PRE-CONSTRUCTION CONFERENCE

.1 Pre-work Conference in accordance with General Requirements.

.2 Convene pre-work conference minimum five (5) working days prior to beginning site installation of mock-up.

.3 Establish date, time and location of conference and notify parties concerned minimum five (5) working days before conference.

.4 Construction Manager, Contract Administrator, Commissioning Authority, Building Envelope Commissioning Authority, and installers involved in work to be in attendance.

.5 Agenda for conference:

.1 Confirm lines of communication and Building Envelope Commissioning Team contacts.

.2 Verify project requirements, design, and intent of design.

.3 Review installation and substrate conditions.

.4 Co-ordinate with subtrades.

.5 Review manufacturer’s installation instructions and warranty requirements.

.6 Review compatibility of materials.

1.6 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 Submittal Procedures.

.2 Submit test results from testing agency for each specified test, maximum one week following completion of testing.

.3 The manufacturer for each component of the building envelope, including but not necessarily limited to all aluminum windows and associated adjacent wall assembly components, shall provide written verification that the proposed material and systems will meet or exceed the requirements of the Contract Documents.

.4 Product Data

.1 Provide product data for:

.1 Section 08 11 13 – Steel Doors and Frames

.2 Section 08 42 29 – Automatic Sliding Entrance Doors

.3 Section 08 44 00 – Aluminum Framed Glazing Systems

.4 Section 08 54 13 – Fiberglass Windows

.5 Section 08 80 00 – Glass and Glazing

.6 Section 08 91 19 – Louvres

.5 Shop Drawings

.1 Provide shop drawings for:

.1 Section 08 11 13 – Steel Doors and Frames

.2 Section 08 42 29 – Automatic Sliding Entrance Doors

.3 Section 08 44 00 – Aluminum Framed Glazing Systems

.4 Section 08 54 13 – Fiberglass Windows

.5 Section 08 80 00 – Glass and Glazing

.6 Section 08 91 19 – Louvres

.2 Qualification Statements:

.3 Submit proof of Testing Agency qualifications for review and acceptance:

.1 Proof of ISO 17025:2005 accreditation.

.2 Minimum five projects completed in last five years demonstrating experience in air leakage testing and water penetration testing of glazed aluminum curtain walls and aluminum windows in accordance with standards specified in this section.

1.7 TESTING AGENCY

.1 Testing Agency:

.1 Third-party accredited testing laboratory.

.2 Accredited to ISO 17025:2005, General requirements for the competence of testing and calibration laboratories.

1.8 QUALITY ASSURANCE

.1 Notify the Contract Administrator, Commissioning Authority, Building Envelope Commissioning Authority, and the Testing Agency in writing of the construction and testing schedule prior to the start of work.

.1 On-site testing and reporting of the Contractor’s work shall be carried out by the Testing Agency identified by the Building Envelope Commissioning Authority.

.1 Provide a minimum seventy-two (72) hours' notice for openings to be reviewed by Building Envelope Commissioning Authority.

.2 Field review/Testing frequency:

.1 On-Site Mock-Up Review and/or testing of openings:

.1 Review the mock-ups at completion milestones. Unless otherwise noted, mock-ups to be the first installation of the openings including thermal and moisture protection components.

.2 Provide a minimum seventy-two (72) hours' notice for openings to be reviewed by Building Envelope Commissioning Authority.

.2 On-Site Quality Assurance Review and/or Testing

.1 Visual review and testing of the installed openings including thermal and moisture protection components may be periodically completed at the discretion of the Building Envelope Commissioning Authority.

.2 Provide a minimum seventy-two (72) hours' notice for openings to be reviewed by Building Envelope Commissioning Authority.

PART 2- PRODUCTS

2.1 Not Used.

PART 3- EXECUTION

3.1 STEEL DOORS AND FRAMES

.1 Provide a mock-up of steel doors and frames at a location identified by the Building Envelope Commissioning Authority prior to full system installation.

.1 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.2 AUTOMATIC SLIDING DOORS

.1 Provide a mock-up of automatic sliding entrance doors at a location identified by the Building Envelope Commissioning Authority prior to full system installation.

.1 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.3 ALUMINUM FRAMED GLAZING SYSTEMS

.1 Provide a mock-up of aluminum framed glazing systems at a location identified by the Building Envelope Commissioning Authority prior to full system installation. Mock-up to be at least two (2) bays wide, full-height, and capturing both vertical and horizontal mullions, jambs, head, and sill conditions.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.1 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

.3 Testing: Mock-Up:

.1 Water leakage testing:

.1 Provide means for capture and disposal of water generated during the test.

.2 Water penetration testing under uniform or cyclic static air pressure difference:

.1 Conduct water penetration testing in accordance with:

.1 ASTM E1105.

.2 AAMA/WDMA/CSA 101/I.S.2/A440.

.3 CSA A440S1.

.2 Conduct water penetration testing as follows:

.1 Static pressure.

.2 Uniform method.

.3 Include the rough opening.

.2 Quantitative air leakage testing:

.1 Air leakage testing under pressurization and depressurization:

.1 Conduct air leakage testing in accordance with:

.1 ASTM E783.

.2 AAMA/WDMA/CSA 101/I.S.2/A440.

.3 CSA A440S1.

.3 Qualitative air leakage testing:

.1 Air leakage testing under pressurization or depressurization:

.1 Conduct air leakage testing in accordance with:

.1 ASTM E1186.

.2 AAMA/WDMA/CSA 101/I.S.2/A440.

.3 CSA A440S1.

.4 Test pressure in accordance with:

.1 Section 08 44 00.

.2

.5 Frequency of Testing:

.1 One (1) during mock-up (Applies to Rec Centre Only).

.4 Testing: Functional performance:

.1 Water leakage testing:

.1 Provide means for capture and disposal of water generated during the test.

.2 Water penetration testing under static air pressure difference:

.1 Conduct water penetration testing in accordance with:

.1 AAMA 501.1

.2 AAMA/WDMA/CSA 101/I.S.2/A440.

.3 CSA A440S1.

.2 Test pressure in accordance with:

.1 Section 08 44 00.

.3 Frequency of Testing:

.1 One (1) full day of testing covering as much area as possible (Applies to Rec Centre Only).

3.4 FIBERGLASS WINDOWS

.1 Provide mock-ups of fiberglass windows at locations identified by the Building Envelope Commissioning Authority prior to full system installation.

.1 Include all detailing at head, jambs, mullions, and sill, including waterproofing, air sealing, sealants, flashings, and any other detailed assembly components.

.2 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.1 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

.3 Testing: Mock-Up and Functional Performance:

.1 Water leakage testing:

.1 Provide means for capture and disposal of water generated during the test.

.2 Water penetration testing under uniform or cyclic static air pressure difference:

.1 Conduct water penetration testing in accordance with:

.1 ASTM E1105.

.2 AAMA/WDMA/CSA 101/I.S.2/A440.

.3 CSA A440S1.

.2 Conduct water penetration testing as follows:

.1 Static pressure.

.2 Cyclic method.

.3 Include the rough opening.

.2 Quantitative air leakage testing:

.1 Air leakage testing under pressurization and depressurization:

.1 Conduct air leakage testing in accordance with:

.1 ASTM E783.

.2 AAMA/WDMA/CSA 101/I.S.2/A440.

.3 CSA A440S1.

.3 Qualitative air leakage testing:

.1 Air leakage testing under pressurization or depressurization:

.1 Conduct air leakage testing in accordance with:

.1 ASTM E1186.

.2 AAMA/WDMA/CSA 101/I.S.2/A440.

.3 CSA A440S1.

.4 Test pressure in accordance with:

.1 Section 08 54 13.

.5 Frequency of Testing:

.1 One (1) during Mock-ups. (Applies to Daycare Only)

.2 One (1) additional unit randomly selected during remainder of installation. (Applies to Daycare Only)

3.5 LOUVRES

.1 Provide a mock-up of louvres and frames at a location identified by the Building Envelope Commissioning Authority prior to full system installation.

.1 Visual review:

.1 Visual reviews shall be performed by the Building Envelope Commissioning Authority to determine general conformance with requirements of the Contract Documents.

.2 Frequency of visual reviews:

.1 Once during Mock-up.

.2 Randomly during remainder of installation at the discretion of the Building Envelope Commissioning Authority.

3.6 ANALYSIS AND CORRECTIVE PROCEDURES

.1 Repair all damages from testing.

.2 Remediate non-conforming work identified during visual reviews and testing.

.3 Do not cover any remediated work until reviewed by the Building Envelope Commissioning Authority, or until the Building Envelope Commissioning Authority has reviewed proof of remediation.

.4 Re-testing of remediated work shall be at the discretion of the Building Envelope Commissioning Authority.

.5 Costs for repairs, remediation of non-conforming work, and re-testing are the responsibility of the Contractor. No additional costs to be submitted to the The City for repairs or testing.

3.7 REPORTING

.1 Prepare reports in accordance with the specified test methods.

.2 Reports to include modifications and repairs made to the test specimen.

.3 Submit reports withing 5 working days following field observations and testing.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Hollow metal doors and panels (steel doors).

.2 Insulated metal doors (insulated steel doors).

.3 Metal frames (steel frames, transom frames).

.4 Thermally broken metal door frames (thermally broken steel frames).

.5 Metal frames (steel frames for screens, sidelights, window assemblies).

1.2 Administrative Requirements

.1 Coordination:

.1 Cooperate fully with finish hardware distributor's representative during preparation of shop drawings and execution of shop fabrication.

.2 Coordinate installation of doors and frames with installation of hardware specified in Section 08 71 00.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Submit copy of NAAMM-HMMA 840-07 standard.

.3 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.4 Shop drawings:

.1 Include details of each door and frame type, finish hardware types and locations, frame profiles, door and frame elevations, mitre details, fire protection rating, glazing preparation details and anchor details and locations.

.2 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and in door schedule.

.3 Electrified hardware requirements and preparations shall be clearly indicated on shop drawings.

.4 Submit engineered shop drawings for exterior doors and frames.

.5 Samples:

.1 Submit cut-away sample door, with provision for lockset and hinge, and corner section of frame.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Manufacturers:

.1 Provide doors and frames manufactured by a firm specializing in the design and production of hollow metal steel doors and frames.

.2 Manufacturer shall be a member in good standing of the Canadian Steel Door Manufacturers Association (CSDMA).

1.5 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of this section.

.2 Product handling shall be in accordance with CSDMA Guide Specification for Installation and Storage of Hollow Metal Doors and Frames.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranties:

.1 System:

.1 Labour, materials, and workmanship for work of this section.

.2 The warranty is a total system warranty, and includes hardware, sealants, hanging and fitting, and finishing.

.3 Duration: 2 years.

.2 Glass and glazing: in accordance with Section 08 80 00.

PART 2 - PRODUCTS

2.1 Manufacturers

.1 All Steel Doors 2000 Ltd.

.2 Apex Industries Inc.

.3 Artek Door (1985) Ltd.

.4 Baron Steel Doors & Frames.

.5 Daybar Industries Ltd.

.6 De La Fontaine.

.7 Diamond Manufacturing.

.8 Fleming- Door Products.

.9 M.J. Daley Manufacturing Co. Ltd.

.10 Trillium Steel Doors Limited.

.11 Vision Hollow Metal Limited.

2.2 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.3 Performance/Design Requirements

.1 Exterior insulated metal doors shall be tested to meet a maximum operable U-value of 2.56 $W/m^2.K$ (0.450 $Btu/hr.ft^2.°F$).

.2 Fire rating requirements:

.1 Fire rated labelled doors and frames: tested in accordance with CAN/ULC-S104-15 and listed by a nationally recognized agency having a factory inspection service and shall be constructed as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

.2 Install fire labelled steel door and frame products in accordance with NFPA 80-2013, except where indicated otherwise.

.3 Doors and frames shall function as intended, including but not limited to:

.1 Be in true alignment.

.2 Operate and swing freely, smoothly, and easily.

.3 Remain stationary at any point.

.4 Close evenly and tightly against stops without binding.

.5 Latch positively when doors are closed with moderate force.

.4 Acoustic doors: doors indicated as acoustic shall be provided with accessories per door hardware schedule to meet acoustical rating. Accessories to approval by Contract Administrator.

2.4 Materials

.1 Steel:

.1 Fabricated from tensioned levelled steel in accordance with ASTM A924/A924M-22a, galvanized in accordance with ASTM A653/A653M-18, Commercial Steel CS, Type B.

.2 Steel shall be free of scale, pitting, coil breaks, surface blemishes, buckles, waves, and other defects.

.3 Minimum sheet thickness; uncoated steel sheet: in accordance with Appendix 1 of ANSI/NAAMM HMMA 861-14 “Guide Specifications for Commercial Hollow Metal Doors and Frames”.

.4 Finish: Minimum Galvanneal coating designation ZF120 (A40).

.2 Door core materials:

.1 Honeycomb: Structural small cell 25 mm (1") maximum kraft paper 'honeycomb'. Weight: 36.3 kg (80 lb) per ream (minimum). Density: 16.5 kg/m^3 (1.03 pcf) minimum, sanded to required thickness.

.2 Polyisocyanurate: Closed cell, faced board in accordance with ASTM C1289-19.

.3 Door frame insulation:

.1 Fibreglass batt, minimum density 24 kg/m^3 (1.5 lbs/ft^3) in accordance with ASTM C665-17 or CAN/ULC S702-14.

.2 Mineral-fibre batt, in accordance wpith CAN/ULC S702-14, Type 1.

.4 Grout for hollow metal door frames: in accordance with Section 04 05 13.

.5 Adhesives:

.1 Heat resistant, single component, polyurethane reactive (water) hot melt, thermoset adhesive.

.2 Rigid insulation cores: Heat resistant, epoxy resin based, low viscosity, contact cement.

.3 Lock seam doors: fire resistant, resin reinforced polychloroprene, high viscosity sealant-adhesive.

.6 Primer: rust inhibitive for touch-up.

.7 Finishing hardware: in accordance with Section 08 71 00.

.8 Miscellaneous:

.1 Door silencers: single stud rubber or neoprene type.

.2 Exterior top caps: Rigid polyvinylchloride extrusion.

.3 Frame thermal breaks: Rigid polyvinylchloride extrusion.

.4 Channel glazing stops and glazing trim: formed channel of minimum 0.81 mm (0.032”) (20 gauge) steel, 15.9 mm (5/8") high.

2.5 Fabrication - General

.1 Fabricate steel doors, frames, transoms, sidelights and borrowed lights as applicable, to the design and dimensions indicated. Take field measurements where coordination with adjoining work is necessary.

.2 Fabricate steel doors and frames to be rigid, neat in appearance and free from defects, warp, wave or buckle with all corners square unless otherwise indicated.

.3 Operating clearances:

.1 Clearance at floor: make allowance for indicated finish flooring materials.

.2 Clearances for Fire-Rated Doors: As required by NFPA 80-2013.

.3 Clearances for Non-Fire-Rated Doors: Not more than 3 mm (1/8") at jambs and heads, except not more than 6 mm (1/4") between pairs of doors. Not more than 19 mm (3/4") at bottom.

.4 Drill and tap or reinforce for mortised or surface mounted hardware in accordance with accepted hardware schedule, CSDMA, "Recommended Specifications for Commercial Steel Doors and Frames" NFPA 80-2013, or manufacturers recommendations.

.5 Countersink exposed fasteners unless otherwise shown. Use flat or oval head screws.

.6 Reinforce components to resist stresses imposed by hardware in use.

.7 Allow for anticipated expansion and contraction of frames and supports.

.8 Fit elements at intersections and joints accurately together, in true planes, and plumb and level.

.9 Weld continuously at joints exposed to view or at joints through which air or water could penetrate from the exterior of building to the interior.

.10 Perform welding in accordance with CSA W59-24.

.11 Mortise, reinforce, drill and tap to receive hardware and security devices using templates provided by respective supplier.

.12 Touch up finish damaged during fabrication.

.13 Prepare doors or frames to receive seals where seals are indicated.

.14 Attach labels to suit required fire-protection ratings.

2.6 Fabrication - Steel Doors and Panels

.1 Fabricate steel doors and panels to a thickness of 45 mm (1-3/4"), unless indicated otherwise.

.2 Exterior and insulated doors and panels:

.1 Face sheets fabricated from 1.34 mm (0.053") (16 gauge) steel.

.2 Insulation core:

.1 Polyisocyanurate.

.3 Longitudinal edges mechanically interlocked.

.1 Tack welded at top and bottom of door, 150 mm (6") on centre, and above and below each edge cutout, filled and ground smooth with no visible seams.

.3 Interior and non-insulated doors and panels:

.1 Face sheets fabricated from 1.06 mm (0.042") (18 gauge) steel.

.2 Honeycomb core.

.3 Longitudinal edges mechanically interlocked.

.1 Tack welded at top and bottom of door, 150 mm (6") on centre, and above and below each edge cutout, filled and ground smooth with no visible seams.

.4 Fabricate of composite metal face construction with each face formed from flush sheet steel without visible seams, free of scale, pitting, coil brakes, buckles and waves.

.5 Formed edges shall be true and straight with minimum radius for the thickness of steel used.

.6 Lock and hinge edges shall be bevelled 3 mm in 50 mm (1/8" in 2") unless hardware or door swing dictates otherwise.

.7 Top and bottom of doors shall be provided with inverted, recessed, 1.34 mm (0.053") (16 gauge) steel end channels, welded to each face sheet at 50 mm (2") on centre maximum.

.8 Prior to shipment, mark each door with an identification number as shown on the approved submittal drawings.

.9 Exterior doors shall be provided with factory installed flush PVC top caps. Fire labelled exterior doors shall be provided with factory installed flush steel top caps.

.10 Blank, reinforce, drill and tap doors for mortised, templated hardware. Locate hardware to manufacturer's standard unless indicated otherwise.

.11 Holes 12.7 mm (1/2") and larger shall be factory prepared.

.12 Glazing:

.1 For glazing materials up to and including 8 mm (5/16") thick, doors shall be provided with 0.81 mm (0.032") (20 gauge) steel glazing trim and snap-in glazing stops.

.2 For glazing materials greater than 8 mm (5/16") thick, doors shall receive 0.81 mm (0.032") (20 gauge) steel trim and screw fixed glazing stops. Screws shall be #6 x 32 mm (1-1/4") oval head Tek™ (self-drilling) type at 305 mm (12") on centre maximum.

.3 Glazing trim and stops shall be accurately fitted (within 0.39 mm (0.015”) tolerance), butted at corners, with removable glazing stops located on the 'push' side of the door.

.13 Fabricate closing stiles of paired doors as indicated or scheduled.

.14 Provide 2.36 mm (0.093") (12 gauge) 'flat' or 'Z' astragal at meeting stiles of pairs of doors for fire rating according to the manufacturers listing and as scheduled.

.15 Where indicated in schedule, prepare doors and panels for installation of fire-rated door grilles. If required to meet door grille manufacturer's rated design, provide reinforcement around door grille opening.

2.7 Fabrication - Steel Frames

.1 General: Applicable to frames, transom panel frames, sidelights, and window assemblies.

.2 Exterior and thermally broken frames:

.1 Acceptable Material:

.1 Ceco Door ‘Mercury Thermal Break Frames’.

.2 Fabricated from:

.1 1.70 mm (0.067") (14 gauge) steel.

.3 Supplied set-up and welded (SUW).

.4 Interior and exterior sections of thermally broken frames, separated by continuous bonded thermal break.

.5 Thermally broken sections shall not be assembled by means of screws, grommets or other fasteners.

.6 Welds shall not cause thermal transfers between interior and exterior surfaces of the frame sections.

.7 Closed sections (mullions and center rails) factory insulated with fibreglass batts.

.8 Incorporate head drips of same gauge material as frame and plug weld at 150 mm (6") on centre, fill and sand smooth.

.3 Interior and non-thermally broken frames; welded:

.1 Fabricated from:

.1 1.34 mm (0.053") (16 gauge) steel.

.2 Supplied set-up and welded (SUW).

.4 Factory assembled frame product shall be square, free of defects, warps or buckles.

.5 Set-up and welded corner joints (SUW):

.1 Profile welded–punch mitred, continuously welded on inside of the profile faces, rabbets, returns and soffit intersections, with exposed faces filled and ground to a smooth, uniform seamless surface, as defined in the CSDMA - “Recommended Specifications for Commercial Steel Door and Frame Products”.

.6 Set-up and welded joints at mullions, sills and center rails:

.1 Coped accurately, butted and tightly fitted.

.2 At intersecting flush profile faces, securely weld, fill and grind to flush, smooth, uniform, seamless surface.

.3 At intersecting recessed profile faces, securely weld to concealed reinforcements, with exposed hairline face seams.

.4 At other intersecting profile elements make exposed face seams to hairline tolerance.

.7 Where required due to site access, when required for co-ordination or installation, or shipping limitations, frame product shall be fabricated in sections for splicing in the field.

.1 Field spliced jambs, heads and sills shall be provided with 1.34 mm (0.053") (16 gauge) steel splice plates securely welded into one section, extending 100 mm (4") minimum each side of splice joint.

.2 Field splices at closed sections (mullions or center rails) shall be 1.34 mm (0.053") (16 gauge) steel splice angles securely welded to the abutting member. Face of splice angle shall extend 100 mm (4") minimum into closed sections when assembled.

.3 Field splice joints shall be welded, filled and ground to present a smooth uniform surface by the installation company responsible for installation after assembly.

.8 On factory assembled frame product, provide 2 temporary steel shipping bars welded to the base of the jambs or mullions to maintain alignment during shipping and handling. Remove shipping bars prior to anchoring of frames to floor.

.9 Each door opening shall be prepared for single stud door silencers. Silencers shall be shipped loose for installation by installer, after finish painting.

.1 Single interior doors: 3 at strike jamb.

.2 Pair of interior doors: 2 at header.

.3 Dutch doors: 4 at strike jamb.

.4 Weather-stripped doors: None required.

.5 Sound, light, or smoke sealed doors: None required.

.10 Prior to shipment, mark each frame with an identification number as shown on the approved submittal drawings.

.11 Provide mullions and transom bars of closed construction type. For fixed condition, attach members to frame with butt-welded joints. For removable condition, attach members with removable mullion anchors.

.12 Conceal fastenings unless otherwise indicated.

.13 Anchor frames to floor by 1.34 mm (0.053") (16 gauge) thick angle clips, welded to frame and provide with 2 holes for floor anchorage.

.14 Grind welded corners to a flat plane, fill with metallic paste filler and sand to uniform smooth finish.

.15 Protect strike and hinge reinforcements using guard boxes welded to frames at masonry construction.

.16 Reinforce head of frames wider than 1220 mm (48").

.17 Brace frame units to prevent distortion in shipment and protect finish.

2.8 Hardware Reinforcements and Preparations

.1 Door and frame product shall be blanked, reinforced, drilled and tapped at the factory for fully templated mortise hardware only, in accordance with the approved hardware schedule and templates provided by the hardware supplier.

.2 Door and frame products shall be factory blanked and reinforced only for mortised hardware that is not fully templated.

.3 Where surface mounted hardware, anchor hinges, thrust pivots, pivot reinforced hinges, or non-templated hardware are required frame product shall be reinforced only, with drilling and tapping done by field installation.

.4 Templated holes 12.7 mm (1/2") diameter and larger shall be factory prepared, except mounting and through bolt holes, which shall be by installation on site. Templated holes less than 12.7 mm (1/2") diameter shall be factory prepared only when required for the function of the device (for knobs, levers, cylinders, thumb or turn pieces) or when these holes over-lap function holes.

.5 Hinge reinforcements shall be 3.12 mm (0.123") (10 gauge) steel minimum, high frequency type shall be provided.

.6 Frames shall be prepared for 114 mm (4.5”) standard weight hinges minimum unless otherwise indicated.

.7 Doors and frames in excess of 2450 mm (96") rabbet height shall be prepared for 114 mm (4.5”) heavy weight 4.6 mm (0.180”) hinges minimum.

.8 Lock, strike and flush bolt reinforcements shall be 1.34 mm (0.053") (16 gauge) steel minimum, with extruded tapped holes that provide equivalent number of threads as 2.36 mm (0.093") (12 gauge).

.9 Reinforcements for surface mounted hardware, concealed closers and holders and flush bolts shall be 1.06 mm (0.042") (18 gauge) steel minimum.

.10 Reinforcements are not required for surface applied hardware supplied with thru-bolts and spacers or sex-bolts.

.11 Provide hardware mortises on perimeter frame members to be grouted in masonry or concrete partitions with 0.66 mm (0.026") (22 gauge) steel grout guards.

.12 Electrified hardware:

.1 Where electrically or electronically operated hardware is specified on the schedules or details or the final approved schedule and templates provided by the hardware supplier, hardware enclosures and/or junction boxes, where indicated on the templates, shall be provided and inter-connected with CSA approved 19 mm (3/4") diameter conduit and connectors.

.2 Refer to electrical documents for general electrical rough-in details. At door locations indicated in electrical documents as requiring rough-in only of electrical (ie. where no electrically or electronically operated hardware is specified in the hardware schedule), provide enclosures, boxes, and conduit to permit future installation of devices without removal of grout, demounting of frames, or installation of exposed conduits.

.3 Frames:

.1 Frames with electrified devices shall include electrical connection boxes sized to accommodate devices specified in Section 08 71 00. At time of frame manufacture, electrical connection boxes shall be supplied by Divisions 26, 27, and 28 for installation into frame by work of this section.

.2 Frame electrical connection boxes shall be positioned flush to edge of frame face return. Clearance shall be maintained to allow wall material to be consistently applied for length of frame member. Frame connection boxes shall be welded in place and positioned to allow necessary clearance for electrical trade to install conduit and connection components, with conduit layout in a manner that takes conduit up to ceiling in an uninterrupted configuration and to accommodate wire installation.

.4 Doors:

.1 Doors with electrified devices shall be manufactured to include wire raceway in door panel to accommodate electrified devices, such as electric hinge, power transfer units, electrified locks, electrified door closures and electrified exit devices. Construction of raceways shall provide a continuous conduit or channel between entry and exit points to accommodate wire installation after door manufacture.

.2 Doors with electrified locks may require extended space to accommodate plug-type connection components or wire collection space. Coordinate with work of Section 08 71 00 and obtain hardware templates for electrified hardware clearly indicated on reviewed shop drawings and prior to door manufacture.

2.9 Frame Anchorage

.1 Frame products shall be provided with anchorage appropriate to floor, wall and frame construction.

.2 Each wall anchor shall be located immediately above or below each hinge reinforcement on the hinge jamb and directly opposite on the strike jamb.

.3 Frame products for installation in new masonry walls shall be provided with steel adjustable wall anchors of the T-strap, stirrup or wire, 1.34 mm (0.053") (16 gauge) minimum or 3.96 mm (0.156”) diameter wire. Straps shall be not less than 50 mm (2") x 254 mm (10”) in size, corrugated and/or perforated.

.4 Frame products installed in steel stud and gypsum board partitions shall be provided with 0.81 mm (0.032") (20 gauge) steel snap-in or "Z" stud type anchors.

.5 Jambs of frames in previously placed concrete, masonry or structural steel shall be punched and dimpled to accept machine bolt anchors, 6.4 mm (1/4") diameter, located not more than 150 mm (6") from the top and bottom of each jamb. Anchor preparations and guides shall also be located immediately above or below the intermediate hinge reinforcing and directly opposite on the strike jamb. Each preparation shall be provided with 1.34 mm (0.053") (16 gauge) anchor bolt guides.

.6 Anchor bolts and expansion shell anchors for the above preparations shall be provided by the installation company.

.7 Where frame product is installed prior to construction of the adjacent wall, each jamb shall be provided with 1.34 mm (0.053") (16 gauge) steel floor anchors. Each anchor shall be provided with 2 holes for mounting to the floor and shall be securely welded to the inside of the jamb profile.

.8 On sidelights or windows exceeding 3 m (9’-10”) in width, installed in stud partitions, channel extensions shall be provided from the top of the frame assembly to the underside of the structure above. Extensions shall be fabricated from 2.36 mm (0.093") (12 gauge) steel formed channels, mounting angles and adjusting brackets, with mounting angles welded to the inside of frame head. Formed channels, adjusting brackets and fasteners shall be shipped loose. Channels shall be mechanically connected to mounting angles and adjusting brackets with supplied fasteners, on site, by contractor responsible for installation.

2.10 Sizes and Tolerances

.1 Widths of door openings shall be measured from inside of frame jamb rabbet with a tolerance of ± 1.6 mm (+0.063").

.2 Heights of door openings shall be measured from the finished floor (exclusive of floor coverings) to the head rabbet of the frame with a tolerance of ± 1.2 mm (± 0.047").

.3 Unless finishing hardware dictates otherwise, doors shall be sized so as to fit the above openings and allow a 3 mm (1/8") clearance at jambs and head. A clearance of 19 mm (3/4") between the bottom of the door and the finished floor (exclusive of floor coverings) shall be provided. Tolerances on door sizes shall be ± 1.2 mm (± 0.047").

.4 Manufacturing tolerances on formed frame profiles shall be ± 0.8 mm (± 0.031") for faces, door stop heights and jamb depths. Tolerances for throat openings and door rabbets shall be ± 1.6 mm (± 0.063") and ± 0.4 mm (± 0.016") respectively. Hardware cut-out dimensions shall be as per template dimensions, ±0.4 mm (+0.015").

2.11 Hardware Locations

.1 Hardware preparations in frame product shall be as noted below and locations on doors shall be adjusted for clearances specified under “Sizes and Tolerances” heading in Section 08 11 13.

.2 Top of upper hinge preparation for 114.3 mm (4.5”) hinges shall be located 180 mm (7.5”) down from head, transom mullion or panel as appropriate. The top of the bottom hinge preparation for 114.3 mm (4.5”) hinges shall be located 310 mm (12.625”) from finished floor as defined under “Sizes and Tolerances” heading in Section 08 11 13. Intermediate hinge preparations shall be spaced equally between top and bottom cutouts. For dutch door frames, top and bottom hinge locations shall be as above, with the tops of intermediate hinges located at 930 mm (36.5") and 1403 mm (55.938") from finished floor.

.3 Strike preparations for unit, integral, cylindrical and mortise locks and roller latches shall be centered 1033 mm (40-5/16") from finished floor. Strikes for deadlocks shall be centered at 1220 mm (48") from finished floor. Strikes for panic or fire exit hardware shall be located as per device manufacturer's templates.

.4 Push and/or pulls on doors shall be no higher than 1100 mm (43-1/4") from finished floor.

.5 Preparations not noted above shall be as per hardware manufacturer's templates.

.6 Hardware preparation tolerances shall be in accordance with CSDMA, "Recommended Specifications for Commercial Steel Doors and Frames".

PART 3 - EXECUTION

3.1 Examination

.1 Provide necessary grounds, bracing and strapping for fitting and adequate for securing of the work.

.2 Cooperate with work of other sections to ensure fastenings set by others are provided and located, their work is installed to their specifications and that those responsible for back priming are notified in sufficient time for them to schedule work.

3.2 Installation - Steel Doors and Frames

.1 Set frame product plumb, square, aligned, without twist at correct elevation in accordance with NAAMM-HMMA 840-07, maintaining clearances and hardware locations specified in Section 08 11 13.

.2 Fire labelled product shall be installed in accordance with NFPA 80-2013.

.3 Frame product installation tolerances:

.1 Plumbness tolerance, measured through a line from the intersecting corner of vertical members and the head to the floor, shall be ±1.6 mm (±1/16").

.2 Squareness tolerance, measured through a line 90° from one jamb at the upper corner of the product, to the opposite jamb, shall be ±1.6 mm (±1/16").

.3 Alignment tolerance, measured on jambs, through a horizontal line parallel to the plane of the wall, shall be ±1.6 mm (±1/16").

.4 Twist tolerance, measured at face corners of jambs, on parallel lines perpendicular to the plane of the wall, shall be ±1.6 mm (±1/16").

.4 Brace frame product rigidly in position while building-in. Remove temporary steel shipping jamb spreaders. Install temporary wood spreaders at mid-point of frame rabbet height to maintain frame widths. Remove wood spreaders after product has been built-in.

.5 Provide vertical support at center of head for openings exceeding 1250 mm (48") in width.

.6 Secure anchorages and connections to adjacent construction.

.7 Install louvres and vents.

.8 Adjust operable parts for correct clearances and function.

.9 Steel surfaces shall be kept free of grout, tar or other bonding materials or sealers.

.10 Remove grout or other bonding material from products immediately following installation.

.11 Provide appropriate anchorage for floor and wall construction. Each wall anchor shall be located immediately above or below each hinge reinforcement on the hinge jamb and directly opposite the strike jamb. On each jamb, install 2 anchors for openings up to and including 1525 mm (60") high and install 1 anchor for each additional height of 760 mm (30") of height or fraction thereof, except as indicated below. Frames placed in previously placed concrete, masonry or structural steel shall be provided with anchors located not more than 150 mm (6") from top and bottom of each jamb, and intermediate anchors at 660 mm (26") on centre maximum.

.12 Secure frames set in previously constructed concrete or masonry openings by countersunk expansion bolts at same centres as for adjustable Tee wall anchors. Reinforce frame at fastening location to prevent indentation of frame by fastening device.

.13 Fill and grind smooth “punch and dimpled” frame installations.

.14 Prior to site touch-up, exposed surfaces of galvanneal steel to be finished shall be cleaned to remove foreign matter. Refer to paint manufacturers recommendations for additional information and requirements of Section 09 91 00.

.15 Touch-up exposed field welds shall be finished to present a smooth uniform surface and with a rust inhibitive primer.

.16 Touch-up exposed surfaces that have been scratched or otherwise marred during shipment, installation, and handling shall be with a rust inhibitive primer.

.17 Finish paint in accordance with Section 09 91 00.

.18 Install door silencers.

.19 Properly fasten units and secure in place with concealed fixings wherever possible. Include grounds and furring where required.

.20 Make allowance for deflection to ensure structural loads are not transmitted to frames.

.21 Adjust operable parts for correct clearances and function.

3.3 Installation - Finishing Hardware

.1 Install finishing hardware in accordance with CSDMA, "Recommended Specifications for Commercial Steel Doors and Frames", manufacturers' templates and instructions, and Section 08 71 00.

3.4 Adjusting and Cleaning

.1 Adjust doors to swing freely, smoothly and easily, to remain stationary at any point, to close evenly and tightly against stops without binding, and to latch positively when doors are closed with moderate force.

.2 Adjust hardware so that latches and locks operate smoothly and without binding, and closers act positively with the least possible resistance in use. Lubricate hardware if required by supplier’s requirements.

.3 Adjust doors equipped with closers to close doors firmly against anticipated wind and building air pressure, and to enable doors to be readily opened as suitable for function, location, and traffic.

.4 Clean hardware after installation in accordance with supplier’s requirements.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Flush wood doors with wood veneer facing.

.2 Installation on flush wood doors of wood veneer facing supplied by:

.1 Section 06 40 00.

1.2 Administrative Requirements

.1 Coordination:

.1 Coordinate installation of doors with installation of frames provided as part of the work of other Sections of the Specifications and with hardware specified in Section 08 71 00.

.2 Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

.3 Coordinate with Section 06 40 00 to schedule supply of wood veneer facing so that doors are fabricated in accordance with the construction progress schedule.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.2 Indicate performance duty level for each Material, demonstrating that proposed Material meets or exceeds performance duty level specified. Indicate whether performance duty level has been independently tested or verified.

.3 Shop drawings:

.1 Submit shop drawings for the work of this section complying with the North American Architectural Woodwork Standards 4.0 ("NAAWS") requirements.

.2 Indicate door location using numbering system per door schedule, size, and hand of each door, elevation of each door type, undercuts, bevelling, construction type core and edge construction not covered in product data, and blocking requirements.

.3 Indicate dimensions and locations of factory machining criteria for hardware, and extent of hardware blocking.

.4 Indicate dimensions and locations of cut-outs, including trim for openings.

.5 Indicate door face finish requirements including veneer matching.

.6 Indicate door edge finishing requirements.

.7 Indicate fire ratings for fire rated doors.

.8 Indicate electrified hardware requirements and preparations.

.4 Selection samples:

.1 Submit 3 sets of samples of wood veneer being supplied as part of the work of Section 08 14 00 for initial selection purposes.

.1 Samples shall show full range of grain variation, colour and matching, natural characteristics reflecting wood cut and species, manufacturing characteristics for each wood specifies specified.

.2 First submission to include one set of samples per Contract Administrator request plus one set lighter in tone and one set darker in tone.

.2 Submit samples of wood veneer being supplied as part of the work of Section 06 40 00 in conjunction with wood veneer samples specified under Section 06 40 00, so that veneer may be compared and coordinated for uniformity.

.5 Verification samples:

.1 Submit samples of proposed wood veneer for door faces for each species, cut, and finish specified or scheduled to verify match with selection sample.

.2 Submit cut-away sample of each type of door, to show stile and rail construction, core, cross banding, door face finish and edges.

.3 Submit wood for wood glass stops for light openings, minimum 150 mm (6") long, for each material, type and finish required.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Manufacturer shall be a member in good standing of the Architectural Woodwork Institute or the Architectural Woodwork Manufacturers Association of Canada or the Woodwork Institute.

1.5 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of this section.

.2 Doors shall be marked with door numbers used on shop drawings in the top hinge cavity created by the machining for hinges.

.3 Identify doors with labels. Package with resilient packaging.

.4 Store doors flat at the Site in piles with bottom face on bottom of pile. Protect from moisture by placing water resistant material under skids supporting piles. Cover top of piles and provide air at sides of piles.

.5 Deliver the wood doors only after the building is closed and dry and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period. Do not receive the doors in a damp area. Do not drag the doors on the ground, floor or across one another.

1.6 Site Conditions

.1 During storage and installation: Obtain and comply with NAAWS and with wood door manufacturer's instructions for optimum temperature and relative humidity conditions for wood doors during its storage and installation. In cases of conflict between Architectural Woodwork Standard's requirements and manufacturer's written requirements, the more stringent requirements shall govern. Do not install wood doors until these conditions have been attained.

.2 During finishing: Comply with NAAWS and with wood door manufacturer's temperature and humidity requirements before, during, and after application of finishes. In cases of conflict between Architectural Woodwork Standard's requirements and manufacturer's written requirements, the more stringent requirements shall govern.

.3 During service life of woodwork: Obtain and comply with wood door manufacturer's advice for optimum temperature and humidity conditions.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranties:

.1 System:

.1 Labour, materials, and workmanship for work of this section.

.2 The warranty is a total system warranty, and includes hardware, sealants, hanging and fitting, and finishing.

.3 Duration: 2 years.

.2 Glass and glazing: in accordance with Section 08 80 00.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Flush wood doors, including installation, shall meet the minimum acceptance levels in accordance NAAWS:

.1 Grade: Custom.

.2 Door construction, industry abbreviations and types specified are in accordance NAAWS.

.3 Performance duty level:

.1 Doors shall meet the requirements of ANSI/WDMA I.S. 1A-15A for Extra Heavy Duty Performance Level unless otherwise indicated or scheduled.

.4 Doors and frames shall function as intended, including:

.1 Be in true alignment.

.2 Operate and swing freely, smoothly, and easily.

.3 Remain stationary at any point.

.4 Close evenly and tightly against stops without binding.

.5 Latch positively when doors are closed with moderate force.

.6 No delamination.

.7 No telegraphing of core construction in face panels exceeding 0.254 mm (0.01") in a 75 mm (3") span, and warp exceeding 3 mm (1/8") in a 1066 mm (42") x 2133 mm (84") section.

.5 Fire Rating Requirements; doors indicated or scheduled as fire rated:

.1 Fire rated labelled doors tested to CAN/ULC-S104-15 and listed by a nationally recognized agency having a factory inspection service and shall be constructed as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

.2 Install fire rated doors in accordance with NFPA 80-2013.

.6 Acoustic doors: doors indicated as acoustic shall be provided with accessories per door hardware schedule to meet acoustical rating. Accessories to approval by Contract Administrator.

.7 Single-source manufacturing and fabrication responsibility: a qualified manufacturer shall assume undivided responsibility for wood doors specified in this section, including fabrication and finishing except where site finishing is specified.

2.3 Door Construction - General

.1 Door core bonding:

.1 Solid core doors: Bond stiles and rails to core; abrasive sand core assembly to achieve uniform thickness prior to lamination of door faces.

.2 Blocking:

.1 Provide hardware blocking for doors in accordance with NAAWS and door manufacturer's written requirements according to door performance duty level, and as follows:

.1 Non-rated or 20 minute fire rated doors: Structural composite lumber for hardware blocking.

.2 45, 60, and 90 minute fire rated doors: Tectonite or door manufacturer's standard fire rated material for hardware blocking.

.3 Thickness:

.1 45 mm (1-3/4") minimum unless otherwise indicated or scheduled.

2.4 Wood Veneer Faced Doors

.1 Solid particleboard core, veneer faced, non-fire rated and 20 minute fire rated wood door construction:

.1 Type PC-5, agrifibre core to ANSI A208.1-2009 LD-2 (545 kg/m^3 – 609 kg/m^3 (34-38 lbs/ft^3) density), no added urea-formaldehyde.

.2 Solid fire resistant core; veneer faced, door construction:

.1 45, 60, and 90 minute rated wood doors: Type FD-5, non-combustible mineral core.

.3 Panel edge types:

.1 For vertical edges (stiles) and exposed horizontal edges (rails). (Exposed horizontal edges are those edges that can be viewed from floors above.):

.1 Solid wood edgeband:

.1 Veneer face edge shows.

.2 Solid wood species and edgeband finish:

.1 Species: White Oak.

.2 Transparent finish.

.2 For unexposed horizontal edges (rails):

.1 Non rated or 20 minute fire rated doors: Minimum 25 mm (1") structural composite lumber.

.2 45, 60, or 90 minute fire rated doors: Tectonite or manufacturer's standard fire rated material for fire rated doors.

.4 Wood veneer for transparent finish:

.1 Veneer face grade: Allowable wood veneer face grade characteristics shall comply with NAAWS referenced grade and referenced standards.

.1 Grade: A.

.2 Veneer thickness: Less than 1.00 mm (0.039") thick after sanding.

.3 Veneer grain and pattern direction: vertical, unless otherwise indicated.

.4 Veneer species, cut, and leaf matching: WV-01 supplied by Section 06 40 00 for installation on doors as part of the work of Section 08 14 00.

.5 Veneer assembly matching: Balance.

2.5 Accessories

.1 Wood glass stops: Solid hardwood, species to match face finish, and referenced quality standard.

.2 Finishing hardware: in accordance with Section 08 71 00.

2.6 Fabrication

.1 Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

.1 Clearances: Refer to Part 3 of Section 08 14 00 for clearance tolerances.

.2 Fit doors for automatic door bottoms.

.3 Comply with NFPA 80-2013 for fire-rated doors. Attach labels to suit required fire-protection ratings.

.4 Bevel non-fire-rated doors 3-1/2 degrees (1/8 inch in 2 inches) at lock and hinge edges.

.5 Bevel fire-rated doors 3-1/2 degrees (1/8 inch in 2 inches) at lock edge; trim stiles and rails only to extent permitted by labelling agency.

.2 Fabricate doors with hardware blocking as specified in Part 2 of this Section.

.3 Factory machine doors for finish hardware that is not surface applied. Do not machine for surface hardware. Locate hardware to comply with Door and Hardware Institute (DHI) “Recommended Locations for Architectural Hardware for Flush Wood Doors” (latest edition). Comply with final reviewed hardware schedules, door and frame shop drawings and hardware templates.

.1 Metal astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire rated doors.

.4 Electrified hardware:

.1 Where electrically or electronically operated hardware is specified on the schedules or details or the final approved schedule and templates provided by the hardware supplier, doors with electrified devices shall be manufactured to include wire raceway in door panel to accommodate electrified devices, such as electric hinge, power transfer units, electrified locks, electrified door closures and electrified exit devices. Construction of raceways shall provide a continuous conduit or channel between entry and exit points to accommodate wire installation after door manufacture.

.5 Factory cut and trim openings.

2.7 Factory Finishing

.1 Finish work in factory in accordance with NAAWS and referenced quality standard.

.2 Prior to finishing, handling marks or effects of exposure to moisture removed with a thorough final sanding over surfaces of the exposed portions, using appropriate grit sandpaper, and shall be cleaned prior to applying sealer or finish. Sanding shall be completed just prior to stain or finishing application.

.3 Comply with requirements indicated below for finish system, staining, and sheen.

.1 Sheen: Flat.

.2 Finish with Post Catalyzed Lacquer.

.1 Transparent finish:

.1 Clear (natural).

.4 Seal top and bottom door edges.

PART 3 - EXECUTION

3.1 Installation - General

.1 Execute installation and assembly at the Site using skilled forces under supervision of a competent joinery foreperson.

.2 Install work plumb, level and straight, and fasten it securely to backing to support itself and anticipated superimposed loads.

.3 Build into construction as indicated, or specified in other sections of this specification, or both.

.4 Adequately fasten units and secure in place with concealed fixings wherever possible. Include grounds and furring where required.

3.2 Installation - Doors

.1 Install fire rated doors in accordance with NFPA 80-2013.

.2 Align and fit doors in frames with uniform clearances as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

.3 Clearances:

.1 Clearances shall be as follows except where more stringent clearance is required or indicated:

.1 Between door and frame at heads, jambs, and between pairs of doors: 3.18 mm (1/8") maximum.

.2 Between bottom of door and top of threshold: 6 mm (1/4”) maximum.

.3 At door assemblies having fire-protection rating not less than 20-minutes: not more than 6 mm (1/4”) at the bottom and not more than 3 mm (1/8") at the sides and top.

.4 Seal top and bottom edges of wood doors. Re-seal field cuts in accordance with manufacturer’s written requirements.

.5 Pilot drill screw and bolt holes.

3.3 Installation - Finishing Hardware

.1 Install finishing hardware in accordance with Section 08 71 00.

3.4 Adjusting and Cleaning

.1 Adjust doors to swing freely, smoothly and easily, to remain stationary at any point, to close evenly and tightly against stops without binding, and to latch positively when doors are closed with moderate force.

.2 Adjust hardware so that latches and locks operate smoothly and without binding, and closers act positively with the least possible resistance in use. Lubricate hardware in accordance with supplier's written requirements.

.3 Ensure that doors equipped with closers operate to close doors firmly against anticipated wind and building air pressure, and to enable doors to be readily opened as suitable for function, location and traffic.

.4 Clean hardware after installation in accordance with supplier's requirements.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Architectural access panels.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Indicate locations, types, and sizes of access panels.

.4 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit operation and maintenance data for access panels for incorporation into operations and maintenance manuals.

1.4 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 System:

.1 Labour, materials, and workmanship for work of this section.

.2 The warranty is a total system warranty, and includes hardware, operators, finishing, delivery, hanging, fitting, and refinishing of door and hardware.

.3 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Architectural Access Panels

.1 Acceptable Material:

.1 Bauco Access Panel Solutions Inc. 'Bauco Plus II'.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Description:

.1 Maximum gap between door and frames: 1.5 mm (1/16").

.2 Door: Aluminum frame with gypsum board inlay and structural nylon corner elements. Door is to be taped and finished to match surrounding surface.

.3 Frame: Recessed aluminum frame provides edge similar to gypsum board bead against which wall or ceiling surface can be finished. Finish edge flush with gypsum board in accordance with trim tolerances specified in Section 09 29 00.

.4 Materials: Extruded Aluminum Alloy 6063-T6. 12.7 mm (1/2") or 15.9 mm (5/8") gypsum board inlay, thickness shall be consistent with thickness of surrounding gypsum board. Fibreglass reinforced nylon. Zinc-plated screws, stainless steel springs and retaining wire.

.5 Hinge: concealed, two point pin hinge, non corroding, as suggested by manufacturer.

.6 Latch: Concealed touch latch.

.7 Finish:

.1 Finish gypsum board to Level 4 in accordance with Section 09 29 00.

.2 Paint completed installation in accordance with Section 09 91 00.

PART 3- EXECUTION

3.1 Access Panels - General

.1 Install in accordance with manufacturer's written requirements.

.2 Locations to be reviewed and confirmed by Contract Administrator.

.3 Rigidly secure frames to furring or framing systems.

3.2 Access Panels for Gypsum Board

.1 Locations to be reviewed and confirmed by Contract Administrator.

.2 Install in accordance with manufacturer's written requirements and in coordination with the work of Section 09 29 00.

.3 Install before gypsum board has been taped and finished.

.4 Fasten frame to gypsum board with standard gypsum board fasteners.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Floor access doors.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Further to requirements of Section 01 33 00, show proposed system of anchorage and materials being supplied on shop drawings submitted for review.

.2 Show hardware items, anchorage devices, dimensions, description of materials and finishes, and all other pertinent information.

.4 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 System:

.1 Labour, materials, and workmanship for work of this section.

.2 The warranty is a total system warranty, and includes hardware, operators, finishing, delivery, hanging, fitting, and refinishing of door and hardware.

.3 Duration: 5 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Floor Access Doors

.1 Acceptable Materials:

.1 The Bilco Company 'Type K Single Leaf Access Door'.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Size: 915 mm x 915 mm (36" x 36").

.3 Frame: Extruded aluminum.

.4 Cover: Aluminum diamond pattern plate.

.5 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.6 Finish: Mill finish aluminum.

.7 Locking: Keyed cylinder.

.8 Handle: Flush lift handle to open cover.

.9 Hardware: Type 316 stainless steel.

2.3 Fabrication

.1 Fabricate units of continuous welded construction, with concealed edge trim frame.

.2 Grind welds smooth and flush with adjacent surfaces.

.3 Furnish attachment devices and fasteners of type required to secure access panels to floor assembly.

PART 3- EXECUTION

3.1 Installation

.1 Final door locations to be reviewed and confirmed by Contract Administrator.

.2 Rigidly secure frames to wood structure, flush with adjacent floor finish.

.3 Install in accordance with door manufacturer's written requirements.

.4 Adjust Work to ensure free-running, tightly closing operation. Ensure that installation is free from warp, twist or other distortion. Lubricate operating hardware.

.5 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Coiling metal counter doors (rolling counter grille); MCD1 and MCD2.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Include details of each door and frame type, hardware types and locations, frame profiles, door and frame elevations, anchor details and locations, required clearances and electrical connections.

.2 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and in door schedule.

.4 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit operation and maintenance data for counter door for incorporation into operations and maintenance manuals.

1.4 Quality Assurance

.1 Qualifications:

.1 Subcontractor:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 System:

.1 Labour, materials, and workmanship for work of this section.

.2 The warranty is a total system warranty, and includes hardware, operators, finishing, delivery, hanging, fitting, and refinishing of door and hardware.

.3 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 Acceptable Materials:

.1 Overhead Door Corporation 'Model 650'.

.2 Subject to compliance with the Contract Documents, acceptable equivalent Materials of the following manufacturers may be used upon approval:

.1 Amstel.

.2 Cookson.

.3 Kinnear/Wayne Dalton.

.4 Overhead Door Corporation.

.2 Steel slat curtain, galvanized:

.1 Interlocking flat faced slats, 49 mm (1-15/16") high x 13 mm (1/2") deep, 0.85 mm (0.03") thick (22 gauge) galvanized steel to ASTM A653/A653M-18, commercial quality.

.2 Bottom Bar: Aluminum with continuous lift handle and vinyl astragal.

.3 Endlocks: Fabricate interlocking slat sections with high strength molded nylon endlocks riveted to ends of alternate slats.

.4 Hood: Galvanized steel 0.7 mm (0.03") thick (24 gauge) with reinforced top and bottom edges. Provide minimum 6.3 mm (1/4") intermediate support brackets as required.

.5 Guides: Heavy duty extruded aluminum sections with snap-on cover to conceal fasteners. Provide polypropylene pile runners on both sides of curtain to eliminate metal to metal contact between guides and curtain.

.6 Counterbalance shaft assembly:

.1 Barrel: steel pipe capable of supporting curtain load with maximum deflection of 2.5 mm per 1000 mm (0.03” per 12”) of width.

.2 Spring balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 110 N (25 lbs). Provide wheel for applying and adjusting spring torque.

.7 Brackets: Reinforced steel plate with bearings at rotating support points to support counterbalance shaft assembly and form end closures.

.8 Locks:

.1 MCD2: Locking thumb wing latch located on coil side of bottom bar at each jamb, extending lock bolt through slots in guides. Keyed alike but not master keyed.

.2 MCD1: Masterkeyed cylinder type. Cylinder as supplied by Section 08 71 00. Provide interlock switches on motor operated units. Cylinder to be operable from:

.1 Coil side of bottom bar.

.9 Size: sizes as indicated.

.10 Operation:

.1 Manual crank hoist (MCD2):

.1 Provide crank hoist operator, complete with crank gear box, steel crank drive shaft and geared reduction unit.

.2 Fabricate gear box to completely enclose operating mechanism and be oil-tight.

.2 Motor operated (MCD1):

.1 ULC listed, NEMA 1 enclosure rating, horsepower as recommended by manufacturer.

.2 Power requirements: ___ V, ____ phase.

.3 Provide open drip-proof motor, removable without affecting setting of limit switches, ULC listed thermal overload protection, solenoid brake, planetary reduction gearing and rotary limit switches, transformer with 24 v control secondary, and all integral electrical components prewired to terminal blocks.

.4 Door shall maintain an average closing speed of not more than 229 mm/s (9” per second) during normal and automatic closing.

.5 Control station:

.1 Surface mounted, “Open/Close” key switch with “Stop” push button, NEMA-1.

.3 Operator cover:

.1 Provide 0.7 mm (0.03") thick (24 gauge) galvanized steel sheet cover to enclose exposed moving operating components at coil area of unit. Finish to match door hood.

.4 Electric sensing edge:

.1 2-wire, electric sensing edge seal extending full width of door bottom bar. Contact before door fully closes shall cause door to immediately stop downward travel and reverse direction to the fully opened position. Provide a retracting safety cord and reel or self-coiling cable connection to control circuit.

.11 Finishes:

.1 Galvanized steel:

.1 Phosphate treatment followed by a light grey baked-on polyester powder coat, minimum 0.065 mm (2.5 mils) cured film thickness.

.12 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

PART 3 - EXECUTION

3.1 Preparation

.1 Examine supports and other conditions under which closures are to be installed.

.2 Coordinate with responsible entity to correct unsatisfactory conditions and do not proceed with installation until conditions are corrected.

3.2 Installation

.1 Materials are to be installed by the manufacturer or his authorized representative. Prior to commencement of the work of this section, examine and be assured that conditions will permit a proper installation.

.2 Assemble and erect work plumb, true, square, straight, level and accurate to sizes detailed, to reviewed shop drawings, free from distortion and defects detrimental to appearance and performance.

.3 Supply adequate instructions, templates, and if necessary, supervise installation of the fastenings or accessories requiring to be built-in by work of other sections.

.4 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

3.3 Adjusting and Cleaning

.1 Upon completion of work of this section, clean down material, lubricate and adjust operation as required to obtain optimum performance.

3.4 Closeout Activities

.1 Demonstration:

.1 Provide system demonstration and training to City's maintenance personnel on procedures and schedules related to start-up and shutdown, troubleshooting, servicing, preventive maintenance and procedures for testing and resetting release devices.

.2 Testing:

.1 Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Electric operated fire rated curtain shutter (Fire Shutter 1).

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Clearly indicate materials, operating mechanisms, required clearances and electrical connections.

.4 Templates:

.1 Submit information and templates required for installation of work of this section.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance instructions:

.1 Submit operation and maintenance data for incorporation into operations and maintenance manuals.

1.4 Quality Assurance

.1 Qualifications:

.1 Subcontractor:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified and with approval and training of Material manufacturers.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 System:

.1 Labour, materials, and workmanship for work of this section.

.2 The warranty is a total system warranty, and includes hardware, operators, finishing, delivery, hanging, fitting, and refinishing of door and hardware.

.3 Duration: 10 years.

PART 2 - PRODUCTS

2.1 Manufacturer

.1 Subject to compliance with requirements, provide products by one of the following manufacturers:

.1 Cookson.

.2 Cornell.

.3 McKeon.

.4 Overhead Door Corporation.

.5 Wayne Dalton Corporation.

.6 Substitutions: in accordance with Section 01 25 00.

2.2 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.3 Design Requirements

.1 Regulatory requirements: Oversized label on doors requiring a fire resistance rating, with ULC or WH fire resistance rating label to doors, for fire resistance ratings as indicated.

.2 Install fire labelled door products in accordance with NFPA 80-2013 except where indicated otherwise.

2.4 Products

.1 Acceptable Materials:

.1 Fire shutter 1; fire rated curtain shutter: McKeon ‘D-400’.

.2 Substitutions: in accordance with Section 01 25 00.

2.5 Fire Rated Curtain Shutter Materials

.1 Basis of design:

.1 McKeon ‘Firefighter Series Model D400’.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Assembly design: Curtain shutter operated by a single motor power drive.

.3 Curtain:

.1 Fire rated textile curtain in accordance with UL 10B-20 or CAN/ULC S104-15, consisting of a fire resistant light weight textile composition designed to coil and store into a compact housing.

.2 Curtain weight: no greater than 1.46 kg/m2 (0.3 lbs/sqft).

.4 Bottom bar:

.1 Double steel angle assembly formed to fit the curtain, provide stiffness, limit deflection and allow for a tight fitting closure.

.2 Designed of adequate size and weight to keep the curtain fully extended, taut and level during self-closing while preventing deflection caused by the building’s normal air pressure currents.

.5 Guide assemblies: Fabricated of a steel mounting adjustment angle or tube with integral steel pressure retaining side guides.

.6 Endplates: Minimum 4.8 mm (3/16”) thick steel endplates provided to house and support ends of the barrel assembly.

.7 Hood: Fabricated of minimum 22 gauge G90 galvanized steel to entirely enclose the curtain and barrel assembly, and formed to match brackets. Top and bottom shall be bent and reinforced for stiffness.

.8 Barrel assembly: Structural quality carbon steel seamless pipe of sufficient size and diameter to house operating motor drive, support the curtain assembly and limit horizontal deflection of the fire rated curtain shutter assembly.

.9 Single motor drive unit: Motor drive design including gearbox assembly, electromechanical distance travel limit switches all linked to an internal electromagnetic brake which allows the curtain shutter to operate under normal and fire ready conditions. Motor drive units shall be listed and labeled to test standard UL 325-17.

.10 Control station: Remote flush mount key switch control station marked open, close and stop. Locate where indicated by Contract Administrator.

.11 Fail-safe release device: Built into the motor drive unit as an integral part of the release mechanism.

.1 When power is interrupted to the release mechanism by an alarm condition, the fire rated curtain shutters shall automatically self-close.

.2 In a power failure, a time delay shall prevent the fire curtain shutters from closing for a period of 30 minutes, unless there is an alarm condition at which point the fire rated curtain shutters shall immediately self-close.

.3 Once power has been restored and the alarm condition has been cleared, the release mechanism shall automatically reset and the fire rated curtain shutters shall automatically power themselves back to the fully open position and normal operating condition.

.12 Activation panel:

.1 Basis of design:

.1 McKeon ‘True Test Panel’.

.2 A single activation panel shall activate and automatically reset all the fire curtain shutters on the project.

.3 When activated to close via the activation panel, the fire rated curtain shutters shall self-close under gravity, not power, in accordance with NFPA 80-2013.

.13 Finish:

.1 Hood, guides and bottom bar: Powder coat finish, colour to later selection by Contract Administrator from manufacturer’s standard range.

PART 3 - EXECUTION

3.1 Preparation

.1 Examine supports and other conditions under which closures are to be installed.

.2 Coordinate with responsible entity to correct unsatisfactory conditions and do not proceed with installation until conditions are corrected.

3.2 Installation

.1 Comply with NFPA 80-2013 and follow manufacturer's installation requirements.

.2 Materials are to be installed by the manufacturer or his authorized representative. Prior to commencement of the work of this section, examine and be assured that conditions will permit a proper installation.

.3 Assemble and erect work plumb, true, square, straight, level and accurate to sizes detailed, in accordance with reviewed shop drawings, free from distortion and defects detrimental to appearance and performance.

.4 Supply adequate instructions, templates, and if necessary, supervise installation of the fastenings or accessories requiring to be built-in by work of other sections.

.5 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

3.3 Electrical Wiring

.1 Power shall be brought up to circuit breaker/disconnect switch adjacent to controller under Divisions 26, 27, and 28 - Electrical and in conformance with requirements specified therein.

.2 Wiring from motor to switches, controls, starters, safety devices and other items requiring power shall be carried out under this section.

.3 Use EMT conduit for fixed wiring. Use purpose-made and approved type flexible cables or cords at applicable locations; adequately support so as not to impede access or foul moving parts of equipment.

3.4 Adjusting and Cleaning

.1 Upon completion of work of this section, clean down material, lubricate and adjust operation as required to obtain optimum performance.

3.5 Closeout Activities

.1 Demonstration:

.1 Demonstrate proper operation, testing and reset procedures to City's representative.

.2 Instruct City's representative in maintenance procedures.

.2 Testing:

.1 Test doors for normal operation and automatic closing. Coordinate with authorities having jurisdiction to witness test and sign Drop Test Form.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Automatic sliding entrance doors.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Clearly indicate each type of frame and screen, extrusion profiles, method of assembly, section and hardware reinforcement and mounting plates, locations of exposed fasteners, finishes, glazing systems, glass type, accessories, line of air barrier and drainage path, and as required to completely represent the proposed door system.

.2 Indicate fastening system for anchorage of door frame to opening, and structural design for each door type and size.

.4 Samples:

.1 Submit samples of colour and finish prepared as specified on respective metal components.

.2 Identify samples as to treatment, thickness, alloy, framing composition, colour, manufacture, performance standard and portion of the work to which they apply.

.3 Fabrication shall not proceed without written acceptance of samples from Contract Administrator.

.5 Test reports:

.1 Submit relevant test report prepared by accredited independent testing laboratory, showing compliance with the design criteria of this section.

.6 Energy performance modeling reports:

.1 Model system performance. Submit reports for actual average size and for CSA-rated size; one report to be submitted for each type of glass unit in glazing system.

.1 Overall thermal performance: Submit reports for actual average size, and for CSA rated size for each insulated glazing unit provided per window system. U-values for vision glass and spandrel to be submitted separately.

.7 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for incorporation into the operation and maintenance manuals.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers / applicators / erectors:

.1 Company:

.1 Shall have adequate plant, equipment, and skilled workers to perform the work expeditiously.

.2 Shall have successfully completed installations similar to that specified during a period of at least the immediate past 5 years.

.2 Provide at least one trade specialist who shall be thoroughly trained and experienced in skills required, be completely familiar with referenced standards and requirements of this work, and personally direct installation performed under this section.

.1 Foreperson experience: Shall have 10 years' experience, minimum, as glazing mechanic.

.2 Typical glazing mechanic experience: Shall have 3 years' experience, minimum, as glazers.

.2 Mock-ups: Coordinate with mock-ups specified in Section 08 08 00.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Manufacturer shall have in place a dispatch procedure that shall be available 24 hours a day, 7 days a week for emergency call back service, for duration of both base contract warranty period and extended warranty, including:

.1 A factory-trained technician shall perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the City.

.2 Performance of warranty work and emergency service work during normal business hours.

.3 Extended warranties:

.1 System:

.1 Labour, materials, and workmanship for work of this section.

.2 The warranty is a total system warranty, and includes hardware, sealants, hanging and fitting, and finishing.

.3 Duration: 5 years.

.2 Glass and glazing: in accordance with Section 08 80 00.

PART 2 - PRODUCTS

2.1 Automatic Sliding Entrance System Manufacturer

.1 Subject to compliance with the requirements of the Contract Documents, provide automatic sliding entrance systems by one of the following manufacturers:

.1 ASSA ABLOY Entrance Systems (Besam Entrance Solutions).

.2 Substitutions: in accordance with Section 01 25 00.

2.2 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.3 Performance/Design Requirements

.1 Reinforce units to withstand handling stresses, temperature changes, the effect of shrinkage forces, wind loads, dead and live loads, and related elements.

.2 Design components to achieve sufficient freedom of movement of members to allow for thermal expansion and contraction within the range of air and surface temperatures as applicable to the location of the components without causing harmful buckling, opening of joints, distortion, undue stress on fasteners, breakage of sealants, or other detrimental effects.

.3 Design light gauge aluminum Materials to CAN/CSA S157-05/S157.1-05.

.4 Design and anchor work so that there will be no objectionable distortion or seriously stressed fastenings as the metal expands and contracts. Design and fabricate expansion joints to ensure that they will be, and remain, permanently watertight. Locate joints as shown on reviewed shop drawings. provide necessary wind bracing as required.

.5 Design mullions for maximum deflection of 1/175.

.6 Design to drain to exterior face of the door assembly, any water entering at joints and any condensation occurring within the door assembly.

.7 Performance/design requirements, energy performance:

.1 Performance of the glazing shall be simulated using Window 7.7.10 by Lawrence Berkley National Laboratories (LBNL) or Flixo Pro (version 8.0 or later). Performance of the framing shall be simulated using THERM by LBNL.

.1 Overall thermal performance shall be calculated using weighted area methods in accordance with CSA A440.2 or NFRC 100.

.2 Centre of glass solar heat gain coefficient: NFRC 200 methodology using LBNL WINDOW computer program.

.3 Visible light transmittance: NFRC 200 methodology.

.2 Thermal transmittance (Maximum U-value): Refer to Glazing & Screen Schedule.

2.4 Automatic Sliding Entrance Configuration

.1 Single slide, full breakout, door system (interior):

.1 Configuration: Single slide, two equal panel door unit with one operable leaf and one sidelite unit.

.2 Traffic pattern: Two-way.

.3 Emergency breakaway capability: Interior sliding leaf and sidelite unit.

.4 Mounting: Overhead header installed between jambs.

.2 Bi-parting, full breakout, door system (vestibule):

.1 Configuration: Bi-parting, four equal panel door unit with two operable leaves and two sidelite units.

.2 Traffic pattern: Two-way.

.3 Emergency breakaway capability: Interior sliding leaves and sidelite units.

.4 Mounting: Overhead header installed between jambs.

2.5 Materials

.1 Framing: Extruded aluminum with PVC thermal break, Aluminum Association alloy AA6063-T5 alloy and temper, to the following minimum thicknesses:

.1 Structural header sections: 5 mm (3/16").

.2 Structural frame sections: 3 mm (1/8").

.3 Structural panel sections: Commercial grade.

.2 Glass and glazing: in accordance with Section 08 80 00.

.3 Weatherstripping: durable, non-absorbing material resistant to deterioration by aging and weathering.

.4 Frame sealant: One component elastomeric chemical curing, compatible with insulated glass unit sealants, to ASTM C920-18.

.5 Fasteners; for aluminum framing: Commercial quality steel screws, zinc plated and case hardened.

.6 Fasteners; for concrete/masonry: Commercial quality zinc plated steel concrete screws or bolts.

.7 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.8 Foamed-in-place insulation: in accordance with Section 07 21 00.

.9 Air seal sealant: in accordance with Section 07 27 00.

.10 Sealing of joints perimeter frame joints: in accordance with Section 07 92 00.

2.6 Door Units

.1 Automatic sliding entrance doors shall include operator, header and track, jambs, sliding door panel(s), and sidelite(s).

.2 Mounting configuration: as indicated on drawings.

.3 Door motion shall be single-slide or bi-parting as indicated on drawings.

.4 Acceptable Materials:

.1 Single slide, full breakout, door system (interior doors): ASSA ABLOY Entrance Systems ‘SL500 SA-PP’.

.2 Bi-parting, full breakout, door system (vestibule doors): ASSA ABLOY Entrance Systems ‘SL500’.

.5 Header: Aluminum with removable face plate and capable of self-support up to length of 4877 mm (16’).

.1 Where indicated, provide transom panel of size and type indicated, mounted on header.

.2 Header size to be:

.1 114 mm (4-1/2") deep by 178 mm (7") high.

.6 Track: Aluminum track, 8 mm (5/8") wide and replaceable.

.1 Door-hanger rollers will be non-metallic, sealed ball bearing wheels 44 mm (1-3/4") diameter. Anti-derailing shall be accomplished by means of a separate adjustable roller.

.7 Sliding panels and sidelites:

.1 Mortise and tenon type joints, neatly and mechanically secured. Sash consists of snap-in glass stops, snap-in glazing beads, and vinyl gaskets.

.2 Fabricate from aluminum, 44 mm (1-3/4") deep with narrow stile horizontal and vertical rails. Concealed guides to stabilize bottom of sliding panel.

.3 Weatherstripping:

.1 Lock stile of sliding doors: high pile mohair weatherstripping.

.2 Joining vertical stiles of the sidelite and sliding door panels: integrated mohair weatherstripping with vinyl fin.

.3 Leading stile of sidelite panels at pockets for interlocks: expandable foam inserts.

.4 Bottom rails: concealed adjustable nylon sweep.

.4 Emergency egress: Slide-swing panels shall swing out 90° from any position of slide movement and require no more than 222 N. (50 lbf) of force applied at the lock stile to open. Swing-slide panels and swing-out sidelites shall have torsion spring designed to re-close panel if pushed open in the direction of egress, and shall include intermediate horizontal rail. Units with emergency egress feature are UL listed as an exit way and are compliant with NFPA 101-2018.

.5 Sliding panel and sidelite:

.1 Medium stile horizontal or vertical rails.

.2 Recessed sidelite and track and non-threshold application.

.3 Prep for glazing 8 mm to 25 mm (5/16” to 1”).

.8 Frames and jambs:

.1 Fabricated from aluminum, butt joints, neatly and mechanically secured by means of screws and formed aluminum corner brackets, dimensions as follows:

.1 44 mm (1-3/4") deep by 102 mm (4-1/2") wide.

.9 Thresholds:

.1 Fabricated from aluminum.

.1 Interior doors: manufacturer’s standard.

.2 Vestibule door: thermally broken, self-cleaning track threshold.

.10 Hardware:

.1 Hookbolt Lock latching into jamb or adjacent strike rail.

.2 Maximum Security Lock with 25 mm (31/32") backset.

.3 Keyed Cylinder mounted on exterior side with 29 mm (1-5/32") standard size cylinder.

.4 Thumbturn mounted on interior side.

.5 Lockbolt into breakout carrier frame or reverse into threshold.

.6 Hardware accessories:

.1 Lock Indicator.

.2 Cylinder Guard.

.3 Cylinder Escutcheon.

.11 Locking hardware:

.1 Electrified slide lock shall automatically lock the sliding function of all sliding door panels within the entrance when the door panels are in the closed position.

.2 Vestibule doors:

.1 Autolock fail secure: If power fails, the lock engages. Allows free egress.

.2 Power fail close: If power fails, the door slides closed.

.3 Interior doors:

.1 Autolock fail safe: If power fails, the lock disengages.

.2 Power fail open: If power fails, the door slides open.

.12 Make allowances for deflection of structure and temperature movement. Ensure that structural loads are not transmitted to aluminum work.

.13 Fit intersecting members to flush, hairline, and weather tight joints and mechanically fasten together.

.14 Conceal fastenings from view, unless otherwise indicated.

.15 Fabricate items fitting to the building from measurements taken on the Work as verified from the Work as built. Full responsibility for the proper coordination of the different components of the cladding and doors rests with this section.

.16 Fabricate and assemble work of this section by skilled glazing installers. Do forming operations prior to finishing.

2.7 Door Operators and Controls

.1 Door Operator and Controller:

.1 Electro-mechanical controlled unit utilizing a high-efficiency, energy efficient, DC motor requiring a maximum of 3 amp current draw, allowing 5 operators on one 20 amp circuit. The supplied system shall have the capability to operate at full performance well beyond a brown out and high line voltage conditions (85V – 265V) sensing changes and adjusting automatically. The operator shall allow an adjustable hold open time delay of 0 to 60 seconds and have internal software to incorporate a self-diagnostic system.

.2 Operating Temperature Range: -35°C to 54.44°C (-31°F to 130°F).

.2 Microprocessor Control Box:

.1 Modular control unit to allow for changing technology. Factory-adjusted configuration with opening and closing speeds set to comply with ANSI/BHMA A156.10 requirements and electronic dampening to reduce wear on drive train. Should the drive train operations deviate from design criteria ranges, Watchdog Control Circuit Monitoring will assume command of the system and shut down the automatic function allowing a secondary supervisory circuit to perform as a backup. Control unit shall allow the following functions:

.1 Diagnostics with the ability to produce application data.

.2 Mode Selector Control:

.1 Multi-position rotary knob mode selector control shall allow selection of the indicated functions to be engaged when switch is turned to the appropriate setting.]

.2 Touch pad mode selector control with the following features:

.1 Key operated to lock/unlock the touch pad to prevent accidental change of settings.

.2 Touch pad mode selector with back lit buttons that allow selection of the indicated functions.

.3 Multi-colored, troubleshooting LED indicator for the following conditions: inspection by customer is required, service is required, error condition such as door in breakout position, or confirmation after other button operations.

.4 Connection for the configuration tool interface used for setup.

.5 Bluetooth compatible for connection to a mobile application that allows the following functions (application is for Owner/User use):

.1 Visualize the door position.

.2 Visualize and change the active function of the entrance.

.3 Visualize active error codes and required maintenance to correct condition.

.4 Visualize the number of door cycles.

.3 Mode Selector Control Mounting: Control shall be mounted as indicated:

.1 Jamb mounted.

.4 Mode selector control to allow the following functions:

.1 “Off”

.2 “Exit Only” one way traffic with automatic operation from the interior.

.3 “Two Way Traffic” allowing automatic operation from exterior and interior.

.4 “Partial Opening” energy saving door position allows door to automatically adjust opening width based on amount of usage, that is, full open during high use and partial open during low use. The control for this setting is programmable allowing adjustment to both the usage setting and the opening width.

.5 “Hold Open” doors activated and held in the full open position.

2.8 Activation and Safety Control Devices

.1 General: Provide the types of activation and safety devices specified in accordance with ANSI/BHMA standards, for the condition of exposure and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated. Coordinate activation and safety devices with door operation and door operator mechanisms.

.2 Combination Activation Motion Sensor/Safety Presence Sensor:

.1 Shall be a sliding door sensor utilizing K-band microwave technology to detect motion and focused active infrared technology to detect presence, combined in a single housing surface mounted on each side of the header.

.1 Presence sensor shall remain active at all times.

.2 The sensor shall communicate with the automatic door operator through a self-monitoring connection that allows the door to go into a fail-safe mode preventing the door from closing in the event of a sensor failure.

.2 Motion/presence detecting sensors to be field installed and adjusted.

2.9 Electrical

.1 High-Efficiency DC Motor: Maximum of 3 amp current draw, allowing 5 operators to run on one 20 Amp circuit.

.2 Power: Self-detecting line voltage capable control. 120 VAC through 240 VAC, 50/60 Hz, 3 amp minimum incoming power with solid earth ground connection for each door system.

.3 Key impulse input: Input for card readers or remote activation with independent adjustable hold open delay.

.4 Wiring: Separate internal channel raceway free from moving parts.

.5 Brown out / high voltage capability: System has capability to operate at full performance well beyond brown out and high voltage line conditions (85 V – 265 V) sensing changes and adjusting automatically.

2.10 Finishes

.1 Exterior exposed aluminum surfaces: 70% Kynar 500 or Hylar 5000 fluoropolymer resin systems, ceramic pigments and other select inorganic pigments to AAMA 2605-22.

.1 Acceptable Materials:

.1 PPG 'Duranar XL'.

.2 Sherwin-Williams ‘Fluropon Classic’.

.2 Colour: to later selection by Contract Administrator to match curtain wall framing. Colour shall be metallic.

PART 3- EXECUTION

3.1 Examination

.1 Take dimensions at the Site to ensure that adjustments in fabrication or installation are incorporated, that allowance is made for possible deflection of structure at heads and that clearance to other constructions have been maintained.

.2 Ensure that anchors and inserts, installed by others are adequate to meet specified requirements.

3.2 Installation

.1 Door system shall be installed by factory-trained installers in accordance with door system manufacturer's written recommendations and reviewed shop drawings.

.2 Install work plumb, square, level, free from warp, twist and superimposed loads.

.3 Set sill into three continuous beads of silicone sealant and seal as required to prevent water leakage.

.4 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.5 Secure work in required position. Do not restrict thermal movement.

.6 Install hardware in accordance with templates.

.7 Adjust operable parts for correct function.

.8 Install in accordance with CAN/CSA A440.4-19 and requirements of building code.

.9 Fasten jambs at 450 mm (18") o/c maximum spacing with corrosion resistant anchors, and aluminum anchor plates as required.

.10 Explosive actuated or powder actuated fasteners will not be permitted.

3.3 Electrical Wiring

.1 Power shall be brought up to circuit breaker/disconnect switch adjacent to controller under Divisions 26, 27, and 28 and in conformance with requirements specified therein.

.2 Wiring from motor to switches, controls, starters, safety devices and other items requiring power shall be carried out under work of this section in accordance with requirements of Divisions 26, 27, and 28.

.3 Use EMT conduit for fixed wiring. Use purpose-made and approved type flexible cables or cords at applicable locations; adequately support so as not to impede access or foul moving parts of equipment.

3.4 Glazing

.1 Glaze aluminum doors with specified glazing tapes, blocks, and spacer shims in accordance with Section 08 80 00.

3.5 Air Barrier Continuity

.1 It is the responsibility of this section to give complete cooperation in providing and maintaining the continuity of air barrier seal to adjacent materials to which the sliding doors and frames abut.

3.6 Sealant

.1 Apply sealant between frame members, sills and adjacent construction as a part of the work of this section and in accordance with Section 07 92 00.

3.7 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.2 Manufacturer’s field review to be in accordance with Section 01 45 00.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Aluminum curtain wall.

.2 Aluminum entrance doors.

.3 Structural silicone glazing.

.4 Glass and glazing in accordance with Section 08 80 00.

.5 Seal joints within the work of this section in accordance with Sections 07 27 00 and 07 92 00, except where specified otherwise and at abutting joints between this section and the work of other sections.

.6 Air barrier transitions and connections between air barriers of adjacent wall and roofing systems.

.7 Prefinished aluminum panel fabrications, including closures, sills, cap flashings at interface with roofing flashing.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19 and the following requirements:

.1 Review methods and procedures related to glazing systems including the following:

.1 Review flashings, special interface details and scheduling with adjacent material assemblies, penetrations, and conditions of other construction that will affect glazing systems.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Submit warranty specimen prior to commencement of shop drawings.

.3 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.4 Shop drawings:

.1 Submit engineered shop drawings.

.2 Indicate with plans, sections, elevations and sufficient full size details, components and methods of assembly, materials and their characteristics relative to their purpose, and other fabrication information including relationships to adjacent systems including air, vapour, water, and thermal layer continuity.

.3 Indicate rough opening requirements and maximum tolerances of adjacent construction. Provide full scale details of perimeter and interface conditions that integrate the design intent of the Contract Documents.

.4 Identify and describe material types being supplied, wall thicknesses of extrusions, and shapes including connections and grades, dimensions and tolerances (minimum and maximum), attachments, reinforcing, anchorage and locations of fastenings, air barrier transitions to various adjacent building envelope air barrier materials, and provisions for thermal and structural movement between components of this section and adjacent materials.

.5 Include description of materials, metal finishing specifications, and other pertinent information.

.6 Design loads, typical reactions and support movement allowances, both vertical and horizontal, shall be placed on the shop drawings.

.7 Indicate the specification of materials and, where applicable, indicate installation methods and coordination with other sections.

.8 Indicate paths and methods of moisture egress (should this occur) and ventilation of framing and spandrel conditions.

.9 Indicate perimeter firestopping details and shall be prepared in conjunction with and coordinated with Section 07 84 00.

.5 Design calculations:

.1 Submit under seal, calculations prepared by the professional engineer responsible for the preparation of the shop drawings that clearly indicate the following:

.1 Design assumptions regarding loadings related to the building code.

.2 Codes and standards to which calculations are based upon.

.3 Materials proposed and their allowable shear and bending stresses.

.4 Maximum and minimum tolerances for proposed materials including anchors, holes and spacings.

.5 Testing data to confirm compliance with performance requirements for the work of this section.

.6 Analysis for dead, wind, snow and guard loads as required and movements caused by temperature changes, support deflections and building sway.

.7 Analysis to include anchors, glazing members, structural joints, sealants, and glass. Show section property computations for framing members and submit full sized drawings.

.8 Analysis to include thermal performance.

.6 Samples:

.1 Submit 450 mm (18") x 450 mm (18") size samples of types of glass and aluminum framing assemblies with specified finishes. Submit 450 mm (18") x 450 mm (18") size samples of types of spandrel assemblies. Submit 200 mm (8") long samples of typical component sections (head, jamb, sill, meeting rail, and the like), fully assembled, indicating glazing and weatherproof methods.

.2 Control samples:

.1 Submit two 305 mm (12") square samples of aluminum having specified finish of the required colours. Submit samples as many times as required to obtain approval of the range.

.2 Mark direction of metal grain and rolling and aluminum finish application on back of control samples.

.7 Test and evaluation reports:

.1 Submit valid independent laboratory test reports of full-scale mock-up for the specific glazing systems required under the work of this section, including framing members, glazing units, anchorage, slab edge covers, and transitions to adjoining assemblies and materials to demonstrate compliance respecting specified air and water infiltration and environmental separation performance and specified performance requirements specified in this section.

.1 Test reports shall be recent and produced within the past 5 years.

.2 Work shall not be fabricated until laboratory test reports demonstrate compliance with requirements of the Contract Documents. Where independent laboratory test reports do not demonstrate compliance with the Contract Documents include the cost of necessary testing in the Contract Price.

.3 Structural silicone test reports and submittals:

.1 Submit to the Contract Administrator, for record purposes only, the documents from the sealant manufacturer listed hereunder. Materials submitted to the sealant manufacturer for these tests to be from the same supplier and representative of the materials to be used in the Work.

.1 Test reports on adhesion of the silicone to the specified substrates in accordance with ASTM C794-18(2022).

.2 Test reports on compatibility of materials to be used adjacent to the structural silicone in accordance with ASTM C1087-23.

.3 Written recommendation for surface preparation, the cure environments and handling and storage methods for the silicone.

.4 A written statement that shop drawings, design calculations, and Contract Documents have been reviewed.

.2 Suitability of glass: Submit to the Contract Administrator, for record purposes only, glass manufacturer's written statement that proposed types of glass that are to be supported by structural silicone are suitable for such application.

.3 Manufacturing procedures: Before commencing manufacture of frames and applying structural silicone submit for review manufacturing procedures including the gunning, tooling, handling and clamping (if necessary) of glass and frames.

.4 Record forms: Submit for review record forms and labels as specified herein for recording manufactured panels and test samples.

.5 Log book: maintain a log book at the Site, for review by Contract Administrator when requested, recording adhesion and quality control test results performed during the application of structural silicone sealant, as well as concurrent weather conditions.

.6 Perform the following quality control tests in accordance with sealant manufacturer's directions and record results in log book:

.1 Skin-over time/elastomeric test (performed once per day and on each new lot of sealant to be used for one-component sealants).

.2 Quality control test procedures as recommended by manufacturer for two-component sealants.

.3 Adhesion and cure quality control tests procedures as recommended by sealant manufacturer.

.7 Record sealant batches/lots to control Material expiration.

.8 Test reports and verifications:

.1 Submit test reports prepared by independent inspection and testing company verifying that:

.1 Adhesion of sealant to samples of metal and glass is adequate when tested in accordance with ASTM C794-18(2022).

.2 Materials in contact with sealant are compatible with sealant after 4,500 hours, tested in accordance with ASTM C1135-19 using QUV Weatherometer.

.3 Stress on each detailed sealant joint will not exceed design stress of sealant when exposed to specified wind loads.

.4 Insulating glass units will withstand design loads specified in the Contract Documents.

.2 Submit letter from and signed by insulating glass unit manufacturer, on insulating glass unit manufacturer's letterhead, verifying that a review of Contract Documents has been done and size of secondary silicone seal designed is based on design wind loads and glass sizes.

.8 Energy performance modeling reports:

.1 Model system performance. Submit reports for actual average size and for CSA-rated size; one report to be submitted for each type of glass unit in glazing system.

.1 Overall thermal performance: Submit reports for actual average size, and for CSA rated size for each insulated glazing unit provided per window system. U-values for vision glass and spandrel to be submitted separately.

.9 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Provide training to the City in the operation, maintenance, and cleaning of the aluminum framed glazing systems. Submit printed copies of maintenance instructions given to the City.

.2 Operation and maintenance manual shall include recommendations for post-installation testing as part of a monitoring program in accordance with ASTM C1401-23.

.3 Submit maintenance data for cleaning and maintenance for windows, curtain walls for incorporation into the operation and maintenance manuals.

1.5 Quality Assurance - General

.1 Installers / applicators / erectors:

.1 The work of this section shall be performed by a Subcontractor who is regularly engaged in the engineering, manufacture, fabrication, assembly, glazing and installation of curtain wall glazing systems. Subcontractor shall demonstrate to the acceptance of the Contract Administrator, that they have successfully performed on comparable projects over the previous 10 years.

1.6 Quality Assurance - Site Assembly Mock-up, Exterior Screens

.1 Construct at the Site at location as indicated at ‘MU’ detail in Drawings, a production prototype bay, approximately 3 m (9.8’) wide by one full storey unit of curtainwall system, including insulated glass spandrel panel, in order to identify and solve any problems of assembly, erection, and interfacing which may be encountered under site conditions. To resolve any problems which may occur, correct or remove and rebuild as directed by the Contract Administrator. When approved, prototype shall form part of the permanent structure and shall serve as a standard for subsequent work.

.2 Notify City’s designated inspection company prior to the construction of the prototype to have a representative present.

.3 Coordinate with mock-ups specified in Section 08 08 00.

1.7 Quality Assurance - Interior Glazed Screen Mock-up

.1 Construct on the project, a typical two panel installation of each interior glazed screen type provided under work of this section, complete with finishes, sealants, and glazing, as directed by Contract Administrator, for review before proceeding with the remainder of the installation. Location and size of sample installation(s) to be as directed by Contract Administrator.

.2 Coordinate work of sample installation(s) with related work of other sections.

.3 Adjust sample installation(s) as required to gain acceptance of the Contract Administrator. Accepted work may form a part of the final installation.

.4 Work shall match accepted sample installation(s).

1.8 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of this section.

.2 Comply with AAMA CW-10-15 – Care and Handling of Architectural Aluminum from Shop to Site.

.3 Mark components to show location on building and on drawings.

1.9 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranties:

.1 System:

.1 Labour, materials, and workmanship for work of this section.

.2 The warranty is a total system warranty.

.3 Duration: 10 years.

.2 Glass units:

.1 In accordance with Section 08 80 00.

.3 Aluminum finishes:

.1 Repair finishes or replace aluminum that shows evidence of failure to comply with specified performance requirements of factory-applied finishes within specified warranty period.

.2 Duration: 20 years.

.4 Structural silicone:

.1 Repair structural silicone that show evidence of deterioration or failure.

.2 Duration: 20 years.

PART 2 - PRODUCTS

2.1 Manufacturer

.1 Manufacturers shall develop materials and Materials of this and related sections to achieve design intent as indicated and specified.

.2 Subject to compliance with requirements, provide Materials by one of the following manufacturers:

.1 Alumicor Limited.

.2 Kawneer Company Canada Limited.

.3 Oldcastle Building Envelope.

.4 Schüco.

.5 CRL U.S. Aluminum.

2.2 Glazing System Design - Specific Component Requirements

.1 Glass design:

.1 Design glass in accordance with CAN/CGSB 12.20-M89 and Section 08 80 00.

.2 Insulating glass units in accordance with Section 08 80 00.

.2 Curtainwall:

.1 Acceptable Materials:

.1 Alumicor 'ThermaWall 2600 Series', triple glazed.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Description:

.1 Thermally broken assemblies.

.2 For capless installation at glazing units with structural silicone.

.3 Fasteners: concealed.

.3 Aluminum entrances, screens, and framing:

.1 Acceptable entrance framing Materials:

.1 Interior entrance framing:

.1 Curtainwall framing as specified above.

.2 Interior screen framing:

.1 Alumicor 'FlushGlaze BF 3400', sized to suit glazing as indicated.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Exterior entrance framing:

.1 Curtainwall framing as specified above.

.2 Acceptable door Materials:

.1 Interior doors (medium stile):

.1 Recreation:

.1 Alumicor 'Canadiana HD 800A Series'.

.2 CRL US Aluminum '400 Series'.

.3 Kawneer '350 Series'.

.2 Child Care:

.1 Alumicor 'Canadiana 500B Series', modified with dimensions as follows:

.1 Centre rail: 187 mm.

.3 Substitutions: in accordance with Section 01 25 00.

.2 Interior sliding door, surface-mounted, with breakaway function: in accordance with Section 08 42 29.

.3 Exterior sliding door, with breakaway function: in accordance with Section 08 42 29.

.4 Exterior doors (medium stile):

.1 Alumicor 'Thermaporte 7700, T400B series', modified with dimensions as follows:

.1 Centre rail: 187 mm.

.2 Bottom rail: 305 mm.

.2 Substitutions: in accordance with Section 01 25 00.

.5 Exterior doors (narrow stile) glass faced aluminum SSG:

.1 Alumicor 'Phantom Series 100A'.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Description:

.1 Fasteners: concealed.

.2 Door framing connections: Reinforce mechanically-joined corners of doors by welding, spigotting, welding and spigotting or by one piece cast aluminum angle to produce sturdy door unit.

.3 Weather-stripping:

.1 Jambs and head: Dense, bulb polymeric material, resilient and retains weathering ability under normal temperature range.

.2 Door sweeps; exterior doors only: Sweep strip applied to the bottom door rail.

.4 Door hardware; hinges, closers, thresholds, push/pulls, locks, exit hardware, and as indicated: supplied by Section 08 71 00 for installation by this section.

2.3 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.4 Performance/Design Requirements - General

.1 Unless specified otherwise, glazing systems shall be designed to the following standards and references:

.1 American Architectural Manufacturers Association (AAMA).

.2 NGA's GANA 'Glazing Manual'.

.3 GANA 'Sealant Manual'.

.4 IGMA 'North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use'.

.2 Removal and replacement of broken lites of glass shall be possible without cutting metal or moving the main frame in relation to the anchors.

.3 Design glazing system and framing to prevent thermal shock and edge pressure fracture damage to the glass.

.4 Metal faces of flashings, caps, framing and sheet cladding shall be visually flat.

.5 Accurately shape mullion and cover caps at intersecting joints to obtain hairline joints, just wide enough to permit thermal movements.

.6 Anchor design:

.1 Design anchors of the framing members to the building support to accommodate movements specified herein and to allow for construction tolerances.

.7 Noise:

.1 Design the Work so that movements specified herein are accommodated without any audible noise being generated. In general, noise is produced by metal to metal contacts, and/or stresses being built up by movements and suddenly being relieved when friction forces are overcome.

.8 Conceal fasteners connecting and fixing the framing members.

.9 Framing cavity shall be compartmentalized every 6000 mm (236") horizontally and at corners to prevent the movement of air, in accordance with standard rain screen design.

.10 Framing cavity shall be compartmentalized at demarcation of interior and exterior building envelope spaces to prevent the movement of air, in accordance with rain screen design.

.11 Paint system:

.1 Colour shall not fade more than 5 Hunter units when tested according to ASTM D2244-23.

.2 Chalking shall not be in excess of a No. 8 rating when tested according to ASTM D4214-07(2015).

.3 No cracking, checking, peeling, or failure of paint to adhere to bare metal.

.12 Presence of any of the following shall constitute failures including, but are not limited to:

.1 Structural failures including, but not limited to, excessive deflection.

.2 Noise or vibration created by wind and thermal and structural movements.

.3 Deterioration of metals, metal finishes, and other materials beyond normal weathering.

.4 Water penetration through fixed glazing and framing areas.

.5 Failure of operating components.

.6 Failed glass units.

2.5 Performance/Design Requirements - Structural

.1 Design components to the relevant sections of the building code, using limit states design methods.

.2 Design glass in accordance with CAN/CGSB 12.20-M89, except where greater requirements are specified. For the purposes of glass design, cladding design, wind loads shall be taken to have a minimum duration of 60 seconds.

.3 Glass units shall withstand thermal stresses. Base thermal stress calculations on the use of roller shades mounted not less than 64 mm (2-1/2") from the inside face of glass units and slab edge pocket as indicated. Glass units shall also withstand thermal stresses created by shadowing of exterior components or assembly and elevated interstitial space temperatures. Glass thermal stress analysis to be provided as formal submittal.

.4 Design of framing systems shall include necessary adjustments to wall thickness of mullions, mullion reinforcing or other necessary structural design to comply with the specified design requirements. Such design measures shall not relieve the Contractor of achieving other requirements.

.5 Movement criteria: the Work shall be designed and constructed so as to allow for movements of the Work and/or supporting structure as follows:

.1 Expansion and contraction of component materials of the Work produced by an exterior surface temperature range of -35°C to +60°C.

.2 Structural and thermal movements of the reinforced concrete and structural steel as prepared by the Contract Administrator’s structural engineers.

.3 For work connected to adjacent floor slabs the design shall accommodate total differential slab to slab movement of 19 mm (3/4") unless otherwise indicated.

.4 The above movements to be accommodated without overstressing components in the Work, and without buckling, failure of weather seals, undue stress on glass, glass breakage, undue stress on structural elements, or other detrimental effects.

.6 Design aluminum framing members in accordance with CAN/CSA-S157-17/S157.1-17.

.7 Deflection limits:

.1 The deflection of framing members in direction normal to plane of glass when subjected to uniform load deflection test in accordance with ASTM E330/E330M-14 under specified design loads, shall not exceed 1/175 of clear span up to 4110 mm (13’-6”) and to 1/240 of clear span plus 6.4 mm (1/4") for spans greater than 4110 mm (13’-6”) or an amount that restricts edge deflection of individual glazing lites to 19 mm (3/4"), whichever is less.

.2 In the plane of the wall, deflection of framing members shall not reduce the glass or panel bite below 75% of the design dimension and shall not reduce the glass or panel edge clearance below 25% of the design dimension or 3 mm (1/8") whichever is greater. Restrict dimensions further if required for assembly, fit of components or to accommodate movements specified herein.

.3 Deflection limits for sheet metal air vapour barriers including backpans shall be L/240, and at floor slabs a maximum 6.4 mm (1/4") to maintain integrity of smoke seal and firestop, under specified design loads.

.4 For the work of this section, air barrier components, including sealants and membranes shall not fail under design conditions. Failure shall include loss of adhesion, excessive deflection, movement or displacement beyond Material limitations, materials placed under stress beyond manufacturers recommended range.

.8 Glazing that extends to a dimension of less than 1070 mm (42") above the adjacent finished floor level which is greater than 600 mm (24") above the ground on the exterior or interior of the building, shall have the glass, mullions and connections be designed as a guard to the following:

.1 The building code requirements for guards.

.2 The building code requirements for glazing subject to human impact.

.9 Design structural steel structural components and fasteners in accordance with CSA-S16-19.

.10 The design of the structural action of glazing systems shall be "simply supported" and shall not induce bending moment or thrust reactions into the building.

.11 Design systems to withstand own dead load, snow, ice and wind loads and combination thereof, as calculated in accordance with the building code, to maximum allowable deflection without permanent deformation.

.12 Design systems to have a method of attachment to the structure that will take into account peculiarities at the Site so that there shall be no possibility of site and air vibrations or normal temperature movements of the building to loosen, weaken, or fracture the connection between building envelope assembly components and the structure or between the components themselves.

.13 Assembly shall be secured in a manner that will keep stresses on sealant within the sealant manufacturer's recommended working range.

.14 Uniform load: No principal member shall display undue effects or permanent set in the framing members in excess of 0.2% of their clear spans after being subjected to structural load test equal to 1.5 times the specified design load, when tested in accordance with ASTM E330/E330M-14.

2.6 Performance/Design Requirements - Structural Silicone

.1 Design of structural silicone joints shall be carried out by a rational analysis including movements specified herein. Maximum stress shall not exceed 138 kPa (20 PSI) in tension or shear for short term loading. Maximum stress in shear for long term loading due to the dead load of the glass shall not exceed 7 kPa (1 PSI) or the limit imposed by the sealant manufacturer, whichever is less.

.2 Joint shall be essentially rectangular in shape and include no internal corners which could precipitate tearing or create high local stresses.

.3 Design structural glazing systems to recommendations in the AAMA SSGDG-1-17 and in accordance with ASTM C1401-23, including recommendations for post-installation testing and monitoring program.

.4 Structural silicone shall make full contact with aluminum pretreated with corrosion inhibitor. Pretreatment process shall include acid etch and application of corrosion inhibitor in accordance silicone manufacturer’s written requirements.

.5 Structural silicone seals shall accommodate movements without being over-stressed or losing adhesion.

.6 Structural seals, that in the event of failure would result in the glass falling from the frame, shall be applied under controlled factory conditions. This generally applies to glass supported on four sides by structural seals.

.7 Structural seals, that in the event of failure would not result in the glass falling from the frame, may be applied in the field according to approved procedures. This applies to certain glass aspect ratios supported on two sides by structural seals.

2.7 Performance/Design Requirements - Air Filtration and Water Resistance

.1 Air infiltration/exfiltration rate:

.1 Fixed glazing: Maximum 0.2 L/s/m^2 (0.04 cfm/ft^2) of glazing area when tested in accordance with ASTM E283-04 at test pressure of 300 Pa (6.27 psf).

.2 Single entrance doors: Maximum 5.00 L/s/m^2 (1.0 cfm/ft^2) when tested in accordance with ASTM E283-04, at a pressure differential of 75 Pa (1.57 psf).

.2 Water resistance:

.1 Static; fixed and operable glazing: No water penetration shall occur when the work is tested in accordance with ASTM E331-00, amended to prohibit water from passing through interior glazing seals or frame joints, at a test pressure equal to 20% of positive design wind pressure but not less than 720 Pa (15 psf).

.3 Design glazing systems using rain screen principle with the following characteristics:

.1 Interior (room-side) air seal at component interfaces.

.2 Exterior (weather-side) deterrent seal formed by continuous gaskets or flush silicone seal as applicable.

.3 Glazing pockets vented and drained to the exterior.

.4 Extrusions with integral gutters of sufficient depth to carry intruded rainwater and snow-melt to the exterior.

.5 System of baffles to prevent water entering the glazing cavity due to gravity, capillary action or rain momentum.

.6 Metal to metal joints within the glazing cavity shall be designed and installed to be sealed prior to assembly and fixing and so as to provide continuous drainage of water to points of egress from assembly. Where location of drainage must drain more than one lite and/or spandrel, the number of drainage holes shall be increased according to rain screen design principle.

.4 Cap and seal exposed ends of mullions and caps, while not compromising drainage qualities.

2.8 Performance/Design Requirements - Thermal

.1 No condensation or frost shall form on the interior of glazing or framing members when tested under the following conditions:

.1 Interior air: 22°C, 30% R.H.

.2 Exterior air: -35°C, 24 km/h (15 mph) wind speed.

.2 In addition to the above requirements the framing system shall be designed such that condensation or frost will not form on the interior surface of the aluminum members before appearing on the adjacent insulating glass units. To achieve this requirement, any metal on the exterior of the Work will require a thermal break between metal on the interior.

.3 Brackets and attachment shall not cause thermal bridging resulting in interior condensation forming at design conditions.

2.9 Performance/Design Requirements - Energy Performance

.1 Performance of the glazing shall be simulated using Window 7.7.10 by Lawrence Berkley National Laboratories (LBNL) or Flixo Pro (version 8.0 or later). Performance of the framing shall be simulated using THERM by LBNL.

.1 Overall thermal performance shall be calculated using weighted area methods in accordance with CSA A440.2 or NFRC 100.

.2 Centre of glass solar heat gain coefficient: NFRC 200 methodology using LBNL-35298 WINDOW 5.2 computer program.

.3 Visible light transmittance: NFRC 200 methodology.

.2 Thermal transmittance (Maximum U-value):

.1 Fixed framing assembly: U_{cog}-0.12 Btu/°F sq ft/hr.

.2 Fixed framing assembly: U-0.12 Btu/°F sq ft/hr.

.3 Fixed framing assembly, total: U-0.24 Btu/°F sq ft/hr.

.4 Insulated spandrels: U-0.14 Btu/°F sq ft/hr.

.3 Glazing unit assembly performance; based on value achieved without patterned coatings:

.1 Maximum $SHGC_{cog}$: 0.25.

.2 Minimum VLT: 51%.

2.10 Performance/Design Requirements – Acoustic

.1 Design designated glazing assemblies to provide the indicated sound transmission class (STC) when tested to ASTM E90-09.

2.11 Materials

.1 Glass: in accordance with Sections 08 80 00.

.2 Aluminum extrusions: Accurately formed, extruded aluminum alloy in accordance with ASTM B221-21: AA-6063-T5/T6, free from defects impairing appearance, strength and durability.

.3 Aluminum flashing:

.1 Minimum wall thickness: 0.812 mm (0.0320") (20 B&S gauge), unless otherwise indicated.

.2 Aluminum alloy:

.1 For painted finish, where indicated:

.1 In accordance with ASTM B209/B209M-21a: AA3003-H14 Painting Quality.

.2 In accordance with ASTM B209/B209M-21a: AA5052-H32 Painting Quality.

.4 Aluminum sheet panels:

.1 Minimum wall thickness:

.1 Typical, unless indicated otherwise: 3 mm (0.125").

.2 Metal spandrel (MP1): 3 mm (0.125").

.2 Surface flatness: 0.38 mm (0.015") maximum deviation when measured with 150 mm (6") rule.

.3 Squareness: 0.05 mm (0.002") maximum for each 25.4 mm (1") of length at panel edge.

.4 Aluminum alloy:

.1 For painted finish, where indicated:

.1 In accordance with ASTM B209/B209M-21a: 3003H14.

.5 Shims: Utility grade aluminum sheet when not in contact with concrete; stainless steel when in contact with concrete or cementitious substances of thickness required, or galvanized steel.

.6 Air seal gaskets; between unitized glazing assemblies: Silicone or silicone compatible EPDM sheet with Durometer hardness between 50 to 60 or alternate approved by Contract Administrator.

.7 Air barrier materials:

.1 Silicone sheet air barrier transition membrane and manufacturer’s recommended sealants and accessories:

.1 Air barrier to resist specified design loads when subjected to uniform load deflection test in accordance with ASTM E330/E330M-14.

.2 Air barrier transition system to allow no water penetration in accordance with ASTM E331-00 to a design pressure not less than 720 Pa (15 psf).

.3 Acceptable Materials:

.1 Tremco ‘Proglaze ETA Engineered Transition Assembly’.

.2 Substitutions: in accordance with Section 01 25 00.

.8 Fasteners:

.1 Non-magnetic (austenitic) 300 series alloy stainless steel unless otherwise indicated.

.2 Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.

.3 Provide nuts or washers of design having means to prevent disengagement; deforming of fastener threads is not acceptable.

.4 Provide concealed fasteners unless indicated otherwise.

.5 For exposed locations, provide countersunk flathead fasteners with finish matching item fastened.

.9 Anchors: Three-way adjustable anchors with minimum adjustment that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

.1 Inserts and surface mounted supports: Hot-dip galvanized cast-iron, malleable-iron, or steel complying with ASTM A123/A123M-17 or ASTM A153/A153M-16a requirements.

.10 Sheet metal backpans and air barriers: 0.91 mm (0.036") (20 gauge) thickness, galvanized sheet steel in accordance with ASTM A653/A653M-18, Designation G90/Z275.

.1 Fasteners: Corrosion resistant, zinc plated, covered and sealed to sheet metal with silicone sealant.

.11 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.12 Internal sealant and air barrier sealant: One-part, neutral cure, high performance silicone sealant complying with ASTM C920-18, Type S, Grade NS, Class 25, capable of sustaining dynamic movements, SWRI sealant validated.

.13 Insulation at spandrels, closures and flashings: in accordance with ASTM C612-14, Type IVA or IVB, non-combustible in accordance with CAN/ULC-S114-18.

.1 Acceptable Materials:

.1 Johns Manville ‘MinWool Curtainwall’.

.2 Rockwool 'CurtainRock'.

.14 Insulation attachment:

.1 Galvanized stick-pins, welded to sheet metal backpans, located at maximum spacing of 300 mm (12") o/c and within 150 mm (6") from edge of insulation boards. Seal welds with 1 coat zinc-rich coating.

.15 High performance insulation; thin profile, flexible, and compression resistant; high performance insulation blanket:

.1 Performance: ASTM C1728, Type III, Grade A.

.2 Acceptable Materials:

.1 Acquire Industries ‘Aeroll’.

.2 General Insulation Company ‘Pyrogel XTE’.

.3 Warmframe ‘1000 Series TBB’ (RSVP AgencyInc.).

.16 Zinc-rich coating: Touch-up paint for welded galvanized areas; 2 coats of zinc-rich paint in accordance with CAN/CGSB 1.171-98, VOC <340 g/L.

.17 Thermal barrier component:

.1 Rigid polyvinyl chloride or neoprene or polyurethane providing full separation of interior and exterior components. Thickness shall be as required to meet design.

.2 Glass fibre reinforced polyamide porthole extrusion providing full separation of interior and exterior components. Thickness shall be as required to meet design.

.18 Miscellaneous steel: in accordance with CSA G40.21-13, Grade 300W.

.1 Finishes:

.1 Behind air/vapour barrier: CISC/CPMA 2-75 primer.

.2 Exterior to air/vapour barrier, and where condensation could occur: hot dip galvanized after fabrication or Type 300 series stainless steel.

.19 Spacers for glazing sections receiving metal flashed, panels; behind pressure plate: High density polyethylene (HDPE) or PVC.

.20 Structural silicone glazing sealants:

.1 Structural glazing adhesive:

.1 One-part, neutral-cure elastomeric sealant.

.2 ASTM C920-18 Type S, Grade NS, Class 50, Use NT, G and A.

.3 ASTM C1184-18e1 Standard Specification for Structural Silicone Sealant.

.4 SWRI Validation.

.5 Colour: as selected by Contract Administrator from manufacturer's full colour range.

.2 Weatherseal sealant:

.1 Non-staining, low dirt pick-up, medium-modulus, neutral-curing silicone sealant.

.2 ASTM C920-18, Type M or S, Grade NS, Class 50.

.3 SWRI Validation.

.4 Colour: to later selection by Contract Administrator from full range.

.21 Semi-rigid insulation: Refer to Section 07 21 00.

2.12 Finishes

.1 Exposed aluminum surfaces: 70% Kynar 500 or Hylar 5000 fluoropolymer resin systems, ceramic pigments and other select inorganic pigments in accordance with AAMA 2605-22.

.1 Acceptable Materials:

.1 PPG 'Duranar XL'.

.2 Sherwin-Williams 'Fluropon Classic'.

.2 Colour: to later selection by Contract Administrator from manufacturer's full range. Colour shall be metallic.

.2 Acid etch and treat aluminum at structural silicone contact area with corrosion inhibitor in accordance silicone manufacturer's written requirements.

.3 Finish exposed metal fasteners: baked-on finish to match related aluminum surfaces.

.4 Finish steel clips and reinforcing steel with 610 g/m^2 zinc coating in accordance with ASTM A123/A123M-09.

2.13 Fabrication - General

.1 Insofar as practical, execute fitting and assembly in the shop with the various parts or assemblies ready for erection at the Site.

.2 Take field measurements and levels required to verify or supplement those shown for the proper layout and installation of the Work. Coordinate dimensional tolerances in adjacent building elements and confirm prior to the commencement of the work of this section. Commencement of installation floor by floor shall be construed as acceptance of building conditions. Glazing systems shall not deviate from tolerances specified.

.3 Verify measurements at the Site and fabricate systems to suit dimensions at the Site.

.4 Fabricate glazed framing to provide uniform rough opening dimension:

.1 Maximum tolerance will be +/- 3 mm (1/8") for rough opening joint width.

.5 Conceal nuts, bolts, screws, clips and other means of fastening in finished Work, except where shown or specified otherwise.

.6 Maintain dimensional tolerances from vertical and horizontal planes with the closest possible accuracy for the various parts as previously designated.

.7 Means of anchoring systems shall have sufficient adjustment to permit correct and accurate alignment. After adjustment, positively lock anchorage devices in manner to preclude movement, once alignment is achieved.

.8 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.9 Make allowances for deflection of structure above when making connection thereto, and ensure that no structural load is transmitted to glazing systems.

.10 Fixing screws shall be countersunk and concealed. Screws shall be oval head, set flush with adjacent surfaces.

.11 Assume full responsibility for the design of assemblies. Reinforcing, furring and anchoring shall suit each specific condition complying with the parameters previously specified, required and as shown.

.12 Form accurate extrusions with clean, straight, sharply defined profiles free from any defects.

.13 Form flashing bends with clean, straight, sharply defined profiles without damage and discolouration to finish.

.14 Extrusion thickness shall be adequate to satisfy loading and deflection, as required and indicated.

.15 Weld aluminum where required with inert metal arc equipment by methods recommended by the Aluminum Co. of Canada. Welders shall qualify according to CSA W47.2-11(R2020). Make exposed welds continuous and flush with adjacent surface. Do not mar surface finishes with welds in back of exposed aluminum. Do not deform the exposed metal and finish in any way by welding.

.16 Weld steel, where required, in accordance with CSA W59-24. Welded joints shall be of adequate strength and durability with jointing tight and flush. Welder shall be fully approved by the Canadian Welding Bureau and shall comply with CSA W47.1-19, Division 3. Where it is necessary to weld components already galvanized, remove galvanizing for 50 mm (2") around weld and paint over welds where galvanizing is removed as specified hereinafter.

.17 Insert concealed prime painted steel reinforcement into cavities of frame members to the interior side of integral air seal web, sized to adequately withstand wind pressure requirements specified.

.18 Include aluminum cover plates, trim components, bent plates, closure trim, extruded glazing corner posts, drips, flashings, metal spandrels and other components required to complete the installation and as indicated whether specifically labelled/dimensioned or only notionally indicated.

.19 Trim glazing spline at continuous embedded sill flashing locations (to ensure full upturn of flashing) behind pressure plate.

.20 Include thermal barriers, and miscellaneous neoprene pads, shims and washers.

.21 Except at 4-sided SSG installations: Provide weepholes in the glazing recess to drain condensate and water to exterior wall cavity. Provide drainage tubes as necessary to conduct water safely through isolated insulated areas to direct exterior discharge. Seal around tubes.

.22 Metal-to-metal joints which require sealing to maintain weathertightness shall be designed and assembled with a ribbon of sealant that shall be compressed by approximately 50% of its original thickness when the joints are secured.

.23 Fabricate frame systems complete with mullions, head and sill frames, spigots, and plugs for horizontals, spline gaskets, thermal break pressure plates, filler pieces, snap-on caps, and other necessary components.

.24 Sill flashing: extruded aluminum with concealed support, finish to match aluminum frames, 25 mm (1") projection beyond wall cladding surface unless otherwise indicated, designed and installed to prevent water penetration. Locate splice connectors (joint covers) at center line of mullions.

2.14 Fabrication - Aluminum Sheet Panel Construction

.1 Fabricate aluminum sheet panel systems complete with continuous recesses to profiles and sizes shown, and to specified tolerances.

.2 Systems shall be designed and fabricated using non-cumulative, concealed attachment methods.

.3 Anchorage: Allow for expansion and contraction.

.4 Include cold rolled framing, furring, brackets, clips, hangers and incidental components as required for secure fastening and provide weathertight installation including non-corrosive fasteners.

.5 Allow for condensation and inner wall drainage at sill members and other shapes which would otherwise tend to trap water.

.6 Lay out panels to obtain uniform metal and paint grain finish. Mark direction of metal grain and paint application on back of panels.

2.15 Fabrication - Hot Rolled Steel Framing

.1 Fabricate necessary hot-rolled, framing and support members and non-corrosive anchorage members required to support the glazing systems, concealed from view.

.2 Framing members shall be welded construction, designed for welding to weld plates supplied for casting into concrete for welding to steel structure.

.3 Framing finishes:

.1 Exterior to air barrier exposure: Hot-dipped galvanized.

.2 Interior to air barrier exposure: Prime painted CISC/CPMA 2-75.

2.16 Fabrication - Metal Air Barrier

.1 Brake form barrier from sheet metal to permit assembly using self-tapping screws, and attachment using powder-activated or pneumatic fixings or other means of secure fastening.

.2 Make provision in barrier design to accommodate movement resulting from thermal change and from structural deflection.

.3 Form edges to 45° angle to permit peripheral and joint sealing.

.4 Cut, fit and form metal air barriers as required to accommodate conflicting framing connections, mechanical and electrical appurtenances and other obstructions.

2.17 Fabrication Tolerances

.1 Comply with the following maximum tolerances:

.1 Plumb: 3.2 mm in 3 m (1/8” in 10’-0”); 6.35 mm in 12.2 m (1/4” in 40’-0”).

.2 Level: 3.2 mm in 3 m (1/8” in 10’-0”); 6.35 mm in 12.2 m (1/4” in 40’-0”).

.3 Alignment:

.1 Where surfaces abut in line or are separated by reveal or protruding element up to 12.7 mm (1/2") wide, limit offset from true alignment to 1.6 mm (1/16").

.2 Where surfaces are separated by reveal or protruding element from 12.7 to 25.4 mm (1/2” to 1”) wide, limit offset from true alignment to 3.2 mm (1/8").

.3 Where surfaces are separated by reveal or protruding element of 25.4 mm (1") wide or more, limit offset from true alignment to 6.4 mm (1/4").

.4 Variation from plane:

.1 3.2 mm in 3.6 m (1/8” in 12’-0”); 12.7 mm (1/2") over total length.

.2 Framing systems designed to have the glazing legs of the horizontal and vertical members in the same plane shall have a maximum out-of-plane offset of 0.8 mm (1/32”) at the frame corners.

.5 Panels:

.1 Bow: 0.2% of panel dimensions up to 3.2 mm (1/8") maximum.

.2 Indicated size:

.1 Up to 1220 mm (48"): plus/minus 0.76 mm (0.030").

.2 1220 mm to 3050 mm (4’-0” to 10’-0”): plus/minus 1.52 mm (0.060").

.6 Square or rectangular: Maximum 3.2 mm (1/8") difference between diagonal measurements.

.7 Variation from indicated position: plus/minus 3 mm (1/8").

.2 Tolerances shall not be cumulative.

2.18 Source Quality Control

.1 The City will engage the services of an independent inspection and testing company to carry out inspection and testing of work of this section in accordance with Section 01 45 00.

.2 Shop review programme to include:

.1 Visual review of glass edges for chips, crushes, spalls and of edge seals for lack of continuity, exposed spacers or improperly mixed sealants.

.2 Review of aluminum framing joinery for proper fit, frame sealing, and fixing.

.3 Review of backpan fabrication including corner welds, weld treatment, stick pin weld/adhesion.

.4 Review of backpan sealing into frame.

.5 Review of glass placement into frame including setting blocks, side blocks, edge clearance, gasket seating, corner block placement.

.6 Checks of gasket installation, crimping, sealant installation.

.7 Review of shipping, crating and protection procedures.

.8 Verification of glass type, colour uniformity, and position.

.9 Thermal insulation securement and fit.

.10 Condition of drainage cavities.

.11 Verification of low-e coating on insulating glass units.

.12 Verification of secondary seal bite.

.13 Review of structural sealant application and daily logs.

PART 3 - EXECUTION

3.1 Installation - General

.1 Verify dimensions of supporting structure by measurement at the Site so that aluminum framed glazing systems will be accurately designed, fabricated and fitted to the structure.

.2 Coordinate with the work of other sections and hand-over items to be placed during the installation of other work at the proper time to avoid delays in the Work.

.3 Erect frames complete with necessary reinforcing and incidental components.

.4 Include anchors and fastenings shown, specified, or necessary to anchor work together or to work of separate sections. Supply items and inserts required to be built into other work. Submit instructions for proper location, and verify proper positioning. Survey location of imbeds after initial pour to verify tolerances.

.5 Use anchors that will permit sufficient adjustment for accurate alignment.

.6 Accurately fit and rigidly frame together units where required. Match components carefully to produce continuity of line and design. Provide flush hairline joints and weathertight connections.

.7 Ensure adequate clearance and shim space at perimeter of openings.

.8 After welding galvanized steelwork, touch-up weld areas with 2 coats of primer, zinc-rich at galvanized locations.

3.2 Installation Tolerances

.1 Comply with the following maximum tolerances:

.1 Plumb: 3.2 mm in 3 m (1/8” in 10’-0”); 6.35 mm in 12.2 m (1/4” in 40’-0”).

.2 Level: 3.2 mm in 3 m (1/8” in 10’-0”); 6.35 mm in 12.2 m (1/4” in 40’-0”).

.3 Alignment:

.1 Where surfaces abut in line or are separated by reveal or protruding element up to 12.7 mm (1/2") wide, limit offset from true alignment to 1.6 mm (1/16").

.2 Where surfaces are separated by reveal or protruding element from 12.7 to 25.4 mm (1/2” to 1”) wide, limit offset from true alignment to 3.2 mm (1/8").

.3 Where surfaces are separated by reveal or protruding element of 25.4 mm (1") wide or more, limit offset from true alignment to 6.4 mm (1/4").

.4 Variation from plane:

.1 3.2 mm in 3.6 m (1/8” in 12’-0”); 12.7 mm (1/2") over total length.

.2 Framing systems designed to have the glazing legs of the horizontal and vertical members in the same plane shall have a maximum out-of-plane offset of 0.8 mm (1/32”) at the frame corners.

.5 Panels:

.1 Bow: 0.2% of panel dimensions up to 3.2 mm (1/8") maximum.

.2 Indicated size:

.1 Up to 1220 mm (48"): plus/minus 0.76 mm (0.030").

.2 1220 mm to 3050 mm (4’-0” to 10’-0”): plus/minus 1.52 mm (0.060").

.6 Square or rectangular: Maximum 3.2 mm (1/8") difference between diagonal measurements.

.7 Variation from indicated position: plus/minus 3 mm (1/8").

.2 Tolerances shall not be cumulative.

3.3 Semi-Rigid Insulation

.1 Install between aluminum framing and rough openings at exterior walls and where indicated, in accordance with Section 07 21 00.

3.4 Isolation

.1 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

3.5 Air Barrier Continuity with Building Envelope

.1 Provide continuous air barrier transition between work of this section where work interfaces with building envelope air barrier materials. Provide EPDM or PVC glazing pocket filler or joint plug to seal glazing rebate where applicable; sealed airtight with silicone sealant.

.2 Install in accordance with manufacturer's installation instructions, with minimum 150 mm overlap. Seal lap joints and seal perimeter to adjacent building envelope air barrier material with silicone sealant.

.3 Coordinate with adjacent materials for continuity and compatibility.

3.6 Glass and Glazing

.1 Furnish glass for work of this section to requirements herein and in accordance with Section 08 80 00, and assume total responsibility for sizing, design and other aspects of glass work and accessories.

.2 Wherever practicable, factory install glass associated with doors of this section in accordance with requirements stipulated under Section 08 80 00, except as otherwise indicated herein.

3.7 Sealant - Installation

.1 Provide sealants associated with this section, following the requirements of Section 07 92 00. Make entire installation watertight.

3.8 Structural Silicone Glazing

.1 Install silicone sealant in accordance with manufacturer's written requirements, reviewed shop drawings, and ASTM C1401-23.

3.9 Finishing Hardware - Installation

.1 Install finishing hardware in accordance with Section 08 71 00.

3.10 Field Quality Control – Subcontractor

.1 Be responsible for quality control for the work of this section.

.2 Develop a quality control manual for the factory and the field installation. The form of the manual shall be reviewed and accepted by the Contract Administrator. This manual will document quality control practices of the Subcontractor, sub-Subcontractors and major material suppliers. The manual will include, but not be limited to, specific criteria related to:

.1 Surface preparation and sealant application.

.2 Sealant mixing, tack time, set time, butterfly tests.

.3 Paint adhesion testing.

.4 Sealant adhesion testing.

.5 Material compatibility testing.

.6 Sealant staining of porous substrate testing.

.7 Fabrication quality control practices.

.8 Shipping.

.9 Field installation.

.3 Maintain a logbook (copies to be provided to the Contract Administrator at completion of fabrication) documenting date, time, results, and significance of in plant testing carried out linked to daily panel production. The form of this logbook shall be reviewed and accepted by the Contract Administrator.

3.11 Field Quality Control – Field Review

.1 The City will engage the services of an independent inspection and testing company to carry out inspection and testing of work of this section in accordance with Section 01 45 00.

.2 Field review programme to include:

.1 Verification of proper insulation, vapour barrier, and air barrier installation.

.2 Checks of interface and termination seals against other elements.

.3 Review of panel-to-panel air seals, review of adjacent building envelope assemblies.

.4 Review of panel fastening, exterior sealants etc.

.5 Checks of air barriers for continuity, penetrations and correct orientation.

.6 Checks for continuity of insulation plane.

.7 Verification of flashing placement and continuity.

.8 Special review of interfaces between different elements such as wall/roof, curtain wall/masonry, to verify continuity of envelope performance.

.9 Review of exterior applied sealants and flashings.

.10 Confirmation of fastener size, type, and material.

.11 Review of drainage paths to confirm clear.

.12 Verification of glass type and position.

3.12 Field Quality Control – Field Testing

.1 The City will engage the services of an independent inspection and testing company to conduct testing of the installed work in accordance with Sections 01 45 00 and 08 08 00.

.2 The Subcontractor is responsible for alterations, repairs, additions necessary to achieve acceptable performance at the test locations and similar adjustments to completed work.

.3 Test locations will be determined by the Contract Administrator. The Subcontractor shall provide access to the work necessary for the testing agency to conduct testing. The Subcontractor shall prepare framing as necessary during fabrication to allow field testing.

.4 Testing services: Testing and inspecting of representative areas of glazed aluminum curtain walls shall take place as installation proceeds to determine compliance of assemblies with specified requirements.

.5 Field tests: Curtain wall units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests with manufacturer's representative present, Contract Administrator and the inspection and testing consultant. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the Contract Price.

.1 Field testing shall be performed by a qualified independent testing agency in accordance with Section 01 45 00.

.2 Air infiltration: Conduct qualitative air leakage test in accordance with ASTM E1186 by infrared or smoke tracer.

.3 Water penetration: Water penetration tests shall be conducted at a static test pressure of 480 Pa (15 lbf/sq. ft.) to ASTM E1105-15 Procedure A, and no uncontrolled water shall pass the innermost surface of the specimen.

.4 Perform tests in each area as directed by Contract Administrator. Perform at least two three, one at mock-up, one at 25 percent completion and one at 50 percent completion.

.6 Structural silicone:

.1 Perform adhesion tests as specified under the Submittals heading in this section.

3.13 Adjusting and Cleaning

.1 Adjust operating hardware and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

.2 Remove as the work of this section progresses, corrosive and foreign materials which may set or become difficult to remove at time of final cleaning or which may damage members. Inspect as often as required to ensure cleanliness.

.3 Remove non-permanent labels.

.4 Remove dirt and residue from surfaces.

.5 Remove Materials or materials that have been broken, chipped, cracked, discoloured, abraded, or damaged during construction period and provide undamaged Materials or materials meeting the requirements of the Contract Documents.

.6 Wash exposed surfaces with a cleaning solution approved by Material manufacturers.

3.14 Protection

.1 At completion of the Work, remove protective coatings, clean glass and aluminum and remove surplus compounds and sealant materials. Replace or make good defective, scratched or damaged work.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Fixed pultruded fibreglass windows; manual operation.

.2 Trim members, cover and closure plates, head and sill flashings, mullions, sills, and anchors and miscellaneous items required for fabrication and installation.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Submit engineered shop drawings.

.2 Submit fully dimensioned shop drawings detailing the size, shape, profile and finish of each window type, window fasteners, together with erection and hardware data and the relationship of window assemblies to adjacent building components. Indicate paths and methods of moisture egress, drainage and ventilation.

.4 Samples:

.1 Submit finished samples of fibreglass framing, perimeter mouldings and trim, perimeter metal flashing, representative of profiles and colours.

.2 Provide representative finish samples of production items indicating the full range of colour tolerance that will be applicable to this project. Samples shall be large enough to allow good comparison.

.5 Test reports:

.1 Submit test reports prepared by an independent inspection and testing company certifying compliance with requirements of the Contract Documents. Reports shall be based on comprehensive testing of the system by the laboratory within the last 3 years current production of the system by the manufacturer.

.2 Submit test reports of full-scale mock-up for specific glazing system required under the work of this section, including framing members, glazing units, anchorage, and transitions to adjoining assemblies and materials to demonstrate compliance with specified air and water infiltration and environmental separation performance.

.3 Demonstrate compliance with AAMA/WDMA/CSA 101/I.S.2/A440-17 performance class and performance grade.

.4 Submit results of thermal performance modeling of project specific cross sections in accordance with CSA Z5010, including U-values, SHGC and temperature index.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for incorporation into the operation and maintenance manuals.

1.5 Quality Assurance - General

.1 Qualifications:

.1 Subcontractor:

.1 Has adequate plant, equipment, and skilled workers to perform the work expeditiously.

.2 Has successfully completed installations similar to that specified during a period of at least the immediate past 5 years.

.3 Shall be completely familiar with referenced standards and requirements of the work of this section, and with approval of Material manufacturers.

1.6 Quality Assurance - In Situ Mock-up

.1 Construct on the project, a typical sample installation of the window assemblies provided under work of this section, complete with finishes, sealants, and glazing, and including air, vapour, water, and thermal layer continuity with adjacent construction. Install in locations as directed by Contract Administrator, for review before proceeding with the remainder of the installation. Location and size of sample installation(s) shall be as directed by Contract Administrator.

.2 Coordinate work of sample installation(s) with related work of other sections.

.3 Adjust sample installation(s) as required to gain acceptance of the Contract Administrator. Accepted work may form a part of the final installation.

.4 Work shall match accepted sample installation(s).

.5 Coordinate with mock-ups specified in Section 08 08 00.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 System:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

.2 Manufacturer's standard warranty:

.1 Repair finishes or replace frames that show evidence of failure to comply with specified performance requirements including factory-applied finishes.

.1 Duration: 20 years.

.2 Hardware and seals:

.1 Duration: 5 years.

.3 Glass and glazing: in accordance with Section 08 80 00.

PART 2 - PRODUCTS

2.1 Manufacturer

.1 The system described by the Contract Documents has been based on the following system:

.1 Duxton Windows 'FiberWall Series 458'.

.2 Substitutions: Subject to compliance with requirements, provide Materials by one of the following manufacturers:

.1 Duxton Windows & Doors.

.2 Substitutions: in accordance with Section 01 25 00.

2.2 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.3 Glazing System Performance/Design Requirements

.1 Windows shall meet or exceed air and water infiltration and deflection test requirements as defined by AAMA/WDMA/CSA 101/I.S.2/A440-17 for the type, grade and performance class of window units required, and as follows:

.2 AAMA/WDMA/CSA 101/I.S.2/A440-17, and to following minimum criteria:

.1 Air leakage: A3.

.2 Performance class: CW.

.3 Performance grade: PG 40.

.4 Water penetration resistance test pressure: 730 Pa (15.24 psf).

.3 No condensation or frost shall form on the interior of glazing or framing members when tested under the following conditions:

.1 Interior air: 22°C, 30% R.H.

.2 Exterior air: -35°C, 24 km/h (15 mph) wind speed.

.4 Temperature index: minimum 70.

.5 Thermal transmittance value for glazing systems shall be as determined in accordance with CAN/CSA A440.2-19/A440.3-19 or NFRC 100.

.1 Fixed framing and awning window assembly: U-0.97 W/sq. m x K (U-0.17 Btu/°F sq ft/hr).

.6 Unless exceeded by other requirements glazing systems shall be designed to the following industry standards and references:

.1 IGMA North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use.

.2 GANA Glazing Manual.

.3 American Architectural Manufacturers Association (AAMA).

.7 Provide concealed controlled restriction device to limit operable windows to permit maximum opening of 100 mm (4"), when device is engaged, in accordance with building code requirements.

.8 Glazing pockets shall be vented, pressure equalized and drained to exterior.

.9 Anchor design:

.1 Design anchors of the framing members to the building support to accommodate movements specified herein and to allow for standard construction tolerances and tolerances as specified in other sections of these specifications. In no event shall the allowance be less than 25 mm (1") in three directions.

.2 Anchors shall be by approved methods and in no event shall use tapping screws or similar blind fasteners unless engineered and sealed by window manufacturer.

.3 Anchors shall be factory prefabricated, bent and formed.

.10 Conceal fasteners connecting and fixing framing members.

.11 Design components to relevant sections of building code, using limit states design methods.

.12 Glazing that extends to a dimension of less than 1070 mm (42") above the adjacent finished floor level which is greater than 600 mm (24") above the ground on the exterior or interior of the building, shall have the glass, mullions and connections be designed as a guard to the following:

.1 Building code requirements for guards.

.2 Building code requirements for glazing subject to human impact.

.3 Guard loads need not be applied simultaneously with other live or wind loads.

.13 Design systems to withstand own dead load, ice and wind loads and combination thereof, as calculated in accordance with building code, to maximum allowable deflection without permanent deformation.

.14 Uniform load: No principal member shall display undue effects or permanent set in the framing members in excess of 0.2% of their clear spans after being subjected to structural load test equal to 1.5 times the specified design load, when tested in accordance with ASTM E330/E330M-14.

2.4 Performance/Design Requirements

.1 Presence of any of the following shall constitute failure: leakage, defects and malfunction in hardware, and blistering, fading, peeling, flaking, and corrosion under normal usage.

.2 Air infiltration/exfiltration rate:

.1 Maximum 0.5 L/s/m^2 (0.10 cfm/ft^2) of glazing area when tested in accordance with ASTM E283-04 at test pressure of 260 Pa (5.43 psf).

.3 Water resistance:

.1 Laboratory testing in accordance with ASTM E331-00 or ASTM E547-00 at a test pressure qual to 20% of positive design wind pressure but not less than 720 Pa (15 psf).

2.5 Materials

.1 Fibreglass section and members to constructed of pultruded fiberglass. Non-structural accessory members are permitted to be in vinyl or aluminum.

.2 Glass and glazing materials; windows: Insulating glass units in accordance with Section 08 80 00.

.3 Semi-rigid insulation: in accordance with Section 07 21 00.

.4 Sealants: in accordance with Section 07 92 00.

.5 Hardware:

.1 Fasteners: Provide nonmagnetic stainless steel screws, epoxy adhesives, or other material warranted by the manufacturer. Where locks, handles or operators screw anchor through aluminum, reinforce interior with stainless steel splined grommet nuts.

.2 Material shall be corrosion resistant. Hardware must prove its strength and suitability by being installed on units, which are tested in accordance with specifications.

.3 Hinges: concealed, with heavy gauge steel arm and stainless steel track. Provide heavy-duty stainless steel roller hinges as recommended by manufacturer.

.4 Locks: Multi-point sequentially locking bar. Diecast zinc; finish to match frame colour.

.5 Weatherstripping: EPDM closed-cell rubber, fitted continuously around corners.

.6 Screens: 14/18 fiberglass or aluminum strand mesh in removable prefinished extruded aluminum frame in baked enamel finish to match window frames.

.6 Fasteners:

.1 Provide concealed fasteners.

.2 Fastener shall be corrosion resistant, Series 300 (Non-magnetic) stainless steel or zinc plated steel.

.7 Glazing

.1 Factory glaze windows and doors with glass in accordance with Section 08 80 00.

.2 Set glazing using polyethylene closed cell tape or shimmed butyl tape on the exterior and glass stop locked-in from the interior to provide a secure and positive seal for the glass.

2.6 Finishes

.1 Exposed surfaces to be coated with 2 part polymer enamel with minimum dry film thickness of 1.5 mm (37.5 microns) and gloss range of 20 to 55. Finish shall resist chipping, blistering, chalking, discoloration and aging under all atmospheric conditions conforming to AAMA 613-13 Organic Coatings.

.1 Colour: Custom colour as selected by Contract Administrator.

2.7 Fabrication

.1 Fabricate windows as indicated, to requirements of AAMA/WDMA/CSA 101/I.S.2/A440-17.

.2 Fabricate glazed framing to provide uniform rough opening dimension:

.1 Maximum tolerance will be +/- 3 mm (1/8") for rough opening joint width.

.3 Brace frames to maintain squareness and rigidity during shipment and installation.

.4 Provide limiting device to comply with requirements of the building code.

.5 Conceal fastenings from view.

.6 Frame corners are to be connected with molded reinforced polymer shearblocks and mechanically secured. Joints to be factory sealed.

.7 Details of frame construction and profiles shall be as indicated.

PART 3 - EXECUTION

3.1 Installation

.1 Erect work plumb, level, true to line and secure in accordance with requirements of manufacturer and provide joint clearances to allow for expansion.

.2 Secure work adequately and accurately to structure in required position, in manner not restricting normal movement of windows.

.3 Comply with installation requirements of AAMA/WDMA/CSA 101/I.S.2/A440-17.

3.2 Sealant Application

.1 Window frames shall be sealed in accordance with Section 07 92 00.

3.3 Semi-Rigid Insulation

.1 Install between fiberglass framing and rough openings at exterior walls and where indicated, in accordance with Section 07 21 00.

3.4 Field Quality Control - General

.1 Conduct quality control in accordance with Section 01 45 00.

.2 Manufacturer's field review to be in accordance with Section 01 45 00.

3.5 Field Quality Control - Field Review

.1 The Contract Administrator will engage the services of an independent inspection and testing company to carry out inspection and testing of work of this section.

.2 Field review programme to include:

.1 Verification of proper insulation, air barrier installation.

.2 Checks of interface and termination seals against other elements.

.3 Review of window fastening, exterior sealants.

.4 Checks of air and vapour seals/barriers for continuity, penetrations and correct orientation.

.5 Checks for continuity of insulation.

.6 Verification of flashing placement and continuity.

.7 Special review of interfaces between different elements to verify continuity of envelope performance.

.8 Review of exterior applied sealants and flashings.

.9 Confirmation of fastener size, type, and material.

.10 Review of drainage paths to confirm clear.

.11 Verification of glass type and position.

.3 The cost of such inspection and testing will be paid in accordance with Section 01 45 00.

3.6 Field Quality Control - Field Testing

.1 The City will engage the services of an independent inspection and testing company to conduct testing of the installed work in accordance with Sections 01 45 00 and 08 08 00.

.2 Field testing will include but not be limited to tests for static air infiltration and static water penetration to the same performance parameters and pass/fail criteria as the laboratory testing.

.3 Window Subcontractor is responsible for alterations, repairs, additions necessary to achieve acceptable performance at test locations and similar adjustments to all completed work.

.4 Test locations and frequency will be determined by Contract Administrator. Subcontractor shall provide access to work necessary for testing agency to conduct testing. Subcontractor shall prepare framing as necessary during fabrication to allow air and water penetration field testing.

.5 An infrared scan of building envelope may be conducted at completion of envelope construction. Thermal anomalies identified by scan will be investigated by Subcontractor. Subcontractor is responsible for adjustments necessary to resolve anomalies to acceptance of Contract Administrator.

.6 Testing in accordance with Section 08 08 00 for Commissioning of Openings.

.1 Water penetration: Water penetration tests shall be conducted at a static test pressure of 260 Pa (5.4 lbf/sq. ft.) to ASTM E1105-15 and no uncontrolled water shall pass the innermost surface of the specimen.

3.7 Adjusting and Cleaning

.1 Work shall be left clean and unmarred, protected from damage during subsequent construction operations.

.2 After installation has been completed and prior to final inspection, wash work in accordance with manufacturer's recommendations and instructions with a non-alkali soap and water solution, followed with a clear water rinse, and shall refinish where necessary and repair or replace damaged parts, leaving in a complete and finished condition.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Automatic operators.
4. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 01 Section “Cash Allowances”.
2. Division 01 Section “Product Allowances”.
3. Division 01 Section “Closeout Procedures”
4. Division 08 Section “Door Hardware Schedule”.
5. Division 08 Section “Hollow Metal Doors and Frames”.
6. Division 08 Section “Interior Aluminum Doors and Frames”.
7. Division 08 Section “Sound Control Hollow Metal Door Assemblies”.
8. Division 08 Section “Sound Control Wood Door Assemblies”.
9. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
10. Division 08 Section “All-Glass Entrances”.
11. Division 08 Section “Automatic Door Operators”.
12. Division 28 Section “Access Control Hardware Devices”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. NBCC 2020 – National Building Code of Canada.
3. Manitoba Building Code – 2024
4. City of Winnipeg Accessibility Design Standard (rev.2018)
5. NFPA 70 - National Electrical Code.
6. NFPA 80 - Fire Doors and Windows..
7. NFPA 105 - Installation of Smoke Door Assemblies.

8. UL/ULC and CSA C22.2 - Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
9. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.
4. UL 305 - Panic Hardware.
5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:

    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware,

and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

   a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
   b. Complete (risers, point-to-point) access control system block wiring diagrams.
   c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the City has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. The City must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Contract Administrator, and City concerning both standard and electromechanical door hardware and keying.

E. Building Information Modeling (BIM) Qualifications: BIM software tools and processes are used to produce and support data integration of product and technical information used in specifications, submittals, project reviews, decision support, and quality assurance during all phases of Project design, construction, and facility management. Door and hardware schedules and the associated product data parameters are to be derived, updated, and fully integrated with the coordinated Building Information Modeling as required under Division 01.

F. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

G. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

H. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

I. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by

representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

J. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to the City via registered mail or overnight package service. Instructions for delivery to the City shall be established at the "Keying Conference".

1.7 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

D. Building Information Modeling (BIM) Support: Utilize designated BIM software tools and obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

1.8 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive the City of other rights the City may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the City. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Hardware shall not have any visible manufacturer names on exposed materials, except cylinders, when the door is in a closed position.

2.2 BUTT HINGES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

a. Two Hinges: For doors with heights up to 60 inches.
b. Three Hinges: For doors with heights 61 to 90 inches.

c. Four Hinges: For doors with heights 91 to 120 inches.
d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.
b. Cam Lift Hinges: Where specified provide hinges that move the door up and then lower it to create a tight seal when the door is closed.

5. Manufacturers:

a. McKinney (MK) - TA/T4A Series, 5-knuckle.

2.3 CONTINUOUS HINGES

A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Where specified, provide modular continuous geared hinges that ship in two or three pieces and form a single continuous hinge upon installation.
2. Manufacturers:.

a. Pemko (PE).

.

B. Pin and Barrel Continuous Hinges: ANSI/BHMA A156.26 Grade 1-600 pin and barrel continuous hinges with minimum 14 gauge Type 304 stainless steel hinge leaves,

concealed stainless pin, and twin self-lubricated nylon bearings at each knuckle separation. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:

    a. Markar Products; ASSA ABLOY Architectural Door Accessories (MR).
    b. Pemko (PE).

2.4 SLIDING AND FOLDING HARDWARE

A. Concealed Sliding Door Hardware: Fully concealed sliding hardware for barn doors that conforms with ANSI/BHMA A156.14. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide sliding door hardware with functions and features as follows:

    a. Six-way adjustable hanger compatible with doors 31” – 71” wide.
    b. Upper hanger with nylon wheels and steel ball bearings.
    c. Backup safety stop hidden from view.
    d. Soft close and open with push force that meets ADA.
    e. Included safety cable to ensure door remains secured to track.
    f. POM wheels with steel needling bearing.

2. Manufacturers:

    a. Pemko (PE) - Hide Slide.

2.5 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:

    a. Von Duprin (VO) - CON Series.

2.6 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.

3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:

    a. Rockwood (RO).

B. Coordinators: ANSI/BHMA A156.3 door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.

1. Manufacturers:

    a. Rockwood (RO).
    b. Gallery Specialty Hardware (GA)

C. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Pulls, where applicable, shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Leather: Where specified English bridle and Italian Upholstery shall be 10 ounce with hand sewn saddle stiches and hand sewn end line stiches.
6. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
7. Manufacturers:

    a. Rockwood (RO).
    b. Gallery Specialty Hardware (GA)

2.7 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Manufacturer’s Standard.

C. Small Format Interchangeable Cores: Provide small format interchangeable cores (SFIC) as specified, core insert, removable by use of a special key; usable with other manufacturers' cylinders.

D. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.

E. Permanent Cores: Match standard. Reference Division 01 "Cash Allowances" for material required under project. Installation to be included under Division 08 "Door Hardware" base bid package.

1. Manufacturers:

a. Schlage (SC)
b. Best (BE)

F. Keying System: Each type of lock and cylinders to be factory/locally keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Cylinders for Childcare to be “0” Bitted and delivered to the City locksmith for keying..
3. Furnish factory cut, nickel-silver as directed by the City.

G. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (3)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

H. Construction Keying: Provide construction master keyed cylinders.

2.8 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers,

permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:

   a. Lund Equipment (LU).
   b. MMF Industries (MM).
   c. Telkee (TK).

2.9 CYLINDRICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed cylindrical locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide locksets with functions and features as follows:

   a. Meets ANSI/BHMA A156.41 for single motion egress.
   b. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
   c. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
   d. Exceeds ANSI/BHMA A156.2 requirements by 2.6 times for 3,100 in-lb. abusive locked lever torque with no entry while maintaining egress.
   e. Exceeds ANSI/BHMA A156.2 requirements by 8 times for 1,600 lbs. offset lever pull with no entry for protection against attacks.
   f. Exceeds ANSI/BHMA A156.3 requirements by 2 times for latch retraction with 100 lb. preload while maintaining operation in warped doors.
   g. Exceeds ANSI/BHMA A156.3 requirements by 20 times for no access with minimum 100 vertical impacts for protection against vandalism attempts.
   h. Independent return springs allow lock to exceed ANSI/BHMA A156.2 Grade 1 cycle requirements without lever sag.
   i. Status indicators inside, outside, or on both sides of doors as specified with high visibility red/green or red/white icons to display locked or unlocked state in the rose.
   j. Ten-year limited warranty for mechanical functions.

2. Electromechanical locksets shall have the following functions and features:

   a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
   b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
   c. Options to be available for request-to-exit or enter signaling, latchbolt and deadbolt monitoring.
   d. Two-year limited warranty on electrified functions.

3. Manufacturers:

a. Best 9K (BE)
b. Schlage ND (SC).

2.10 DEADLOCKS AND LATCHES

A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.36, Grade 1, small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.

1. Manufacturers:

a. Schlage L400 (SC).
b. Sargent Manufacturing (SA) - 4870 Series.

B. Narrow Case Deadlocks and Deadlatches: ANSI/BHMA 156.13 Series 1000 Grade 1 narrow case deadlocks and deadlatches for swinging or sliding door applications. All functions shall be manufactured in a single sized case formed from 12 gauge minimum, corrosion resistant steel (option for fully stainless steel case and components). Provide minimum 2 7/8" throw laminated stainless steel bolt. Bottom rail deadlocks to have 3/8” diameter bolts.

1. Manufacturers:

a. Adams Rite Manufacturing (AD) - MS1850S / MS1950 Series.
b. Adams Rite Manufacturing (AD) - 4900 Series.

2.11 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.12 ELECTROMAGNETIC LOCKING DEVICES

A. Surface Electromagnetic Locks (Heavy Duty): Electromagnetic locks to be surface mounted type conforming to ANSI A156.23, Grade 2 with minimum holding force strength of 1,200 pounds. Locks to be capable of accepting between 12 to 24 volts direct current and be UL listed for use on fire rated door assemblies. Electromagnetic coils are to consume no more than 1.5W during normal operation. Locks are to have an integrated door position switch, tamper switch, and lock bond sensor. Locks are to have integrated motion sensor and/or security camera as indicated in the hardware sets. Locks to be capable of detecting door prop conditions and entering low power mode. Provide mounting accessories as needed to suit opening conditions. Power supply to be by the same manufacturer as the lock with combined products having a lifetime replacement warranty.

1. Manufacturers:

    a. Securitron (SU) - M680E Series.

2.13 ELECTRIC STRIKES

A. Standard Electric Strikes: Electric strikes conforming to ANSI/BHMA A156.31, Grade 1, for use on non-rated or fire rated openings. Strikes shall be of stainless steel construction tested to a minimum of 1500 pounds of static strength and 70 foot-pounds of dynamic strength with a minimum endurance of 1 million operating cycles. Provide strikes with 12 or 24 VDC capability, fail-secure unless otherwise specified. Where specified provide latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike.

1. Manufacturers:

    a. HES (HS) - 1500/1600 Series.

B. Standard Electric Strikes: Electric strikes conforming to ANSI/BHMA A156.31, Grade 1, for use on non-rated or fire rated openings. Strikes shall be tested to a minimum of 1500 pounds of static strength and 70 foot-pounds of dynamic strength with a minimum endurance of 500,000 operating cycles. Provide strikes with 12 or 24 VDC capability with field selectable fail-secure/fail-safe. Where specified provide latchbolt monitoring indicating both the position of the latchbolt and locked condition of the strike.

1. Manufacturers:

    a. HES (HS) - 5000/5200 Series.

C. Surface Mounted Rim Electric Strikes: Surface mounted rim exit device electric strikes conforming to ANSI/BHMA A156.31, Grade 1, and UL Listed for both Burglary Resistance and for use on fire rated door assemblies. Construction includes internally mounted solenoid with two heavy-duty, stainless steel locking mechanisms operating independently to provide tamper resistance. Strikes tested for a minimum of 500,000 operating cycles. Provide strikes with 12 or 24 VDC capability supplied standard as fail-

secure unless otherwise specified. Option available for latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike. Strike requires no cutting to the jamb prior to installation.

1. Manufacturers:

    a. HES (HS) - 9400/9500/9600/9700/9800 Series.

2.14 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide exit devices with functions and features as follows:

   a. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
   b. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
   c. No catch points: addition of applied deflectors or other added components are not allowed.
   d. No visible plastic.
   e. Heavy duty end caps with flush and overlapping options made of stainless steel, brass, or bronze with architectural finishes.
   f. Constructed of all stainless steel.
   g. Stainless steel pullman type latch with deadlock feature.
   h. Narrow or wide style exterior trim as specified in the hardware sets.
   i. Where specified provide shelter-in-place function that lets you secure a room instantly by pressing a red button on the interior of the device chassis which immediately locks the outside trim. Occupants can still exit by pushing the exit bar from the inside or using an override key on the outside trim, which resets the shelter function.
   j. Center case adjustability on concealed vertical rod exit devices; single operation with hex key individually adjusts top or bottom latches. No retainer screws or clips required to maintain adjustment.
   k. Ten-year limited warranty for mechanical features.

2. Electromechanical exit devices shall have the following functions and features:

   a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
   b. Wire routing for all non-access control electromechanical functions and EcoFlex trim to be contained within the carrier of the device eliminating the need for cavities in doors to be drilled. Include a protective film so that wires don't get damaged if the rail needs to be removed.
   c. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
   d. Options to be available for request-to-exit or enter signaling, latchbolt and touchbar monitoring.
   e. Field configurable electrified trim to fail-safe or fail-secure that operates from 12-24VDC.

3. Manufacturers:

   a. Von Duprin 98/99 – 33A/35A
   b. Sargent Manufacturing (SA) – 80 Series.

2.15 SURFACE DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.

1. Large body cast iron surface mounted door closers shall have a 30-year warranty.
2. Manufacturers:

   a. LCN 4041/4040XP (LC)
   b. Norton Rixson (NO) - 9500 Series.
   c. Sargent Manufacturing (SA) - 281 Series.

2.16 ELECTROMECHANICAL DOOR OPERATORS

A. Electromechanical Door Operators (Moderate Traffic): Provide ANSI/BHMA A156.19 Certified Products Directory (CPD) listed low energy operators that are UL325/991 certified and comply with requirements for the Americans with Disabilities Act (ADA). Operators shall accommodate openings up to 200 pounds and 48” wide.

1. Provide operators with features as follows:

   a. Non-handed with push and pull side mounting.
   b. Activation by wall switch, hands-free or radio frequency devices.
   c. Adjustable opening force and closing power.

d. Two-year limited warranty.
e. Wi-Fi interface where the operator is a secure, password protected WiFi hot spot with no connection to building's IT required.
   1) Simple setup with no app required.
   2) View status and make adjustments without removing the cover.
   3) Built-in logic to support single use restroom applications with no external relay boards, logic modules, position switches required.
f. Mounting backplate to simplify and speed up installation.

2. Operators shall have the following functionality:

a. Adjustable Hold Open: Amount of time a door will stay in the full open position after an activation.
b. Infinite Hold Open: Door will hold open at set position until power is turned off.
c. Latch Assist: At closed position, after an activation, the door is pulled in. After the door has closed, the door is pulled in to assist with latch release/engagement.
d. Obstruction Detection: Door closes if it hits an obstruction while opening; door will reverse to open position if it hits an obstruction while closing. Door will stop once it hits an obstruction and will rest against the obstruction until removed.
e. Open Delay: Delays operator opening for locking hardware.
f. Outside Wall Switch Disable: When contact is closed, outside wall switch is disabled.
g. Power Close: Additional force to assist door closing between 7° and 2°.
h. Presence Detector Input: Input for external sensor to detect presence at door open or close position only.
i. Selector Mode Switch: Off disables the signal inputs unless Blow Open is activated, on activates the signal inputs, hold open activates the unit (unless Blow Closed is activated) to the hold open position.
j. Restroom Function: Built-in, configurable operator logic to support single use restroom applications without the need for external relays, logic modules, or door position switches.
k. Executive Mode Feature: When the door receives an activation signal it opens and remains open until either a second signal is received, or the door is manually moved in closing direction.

3. Manufacturers:

a. Horton 4100LE
b. Horton 7100.

2.17 ELECTROHYDRAULIC DOOR OPERATORS

A. Electrohydraulic Door Operators (Moderate Traffic): Provide ANSI/BHMA A156.19 Certified Products Directory (CPD) listed low energy operators that meet ANSI/BHMA A156.4 requirements and are UL listed for use on fire rated doors and UL10C certified that comply with requirements for the Americans with Disabilities Act (ADA). Operators

shall be manufactured in an ISO 9001 and ISO 14001 certified facility and accommodate openings up to 250 pounds and 48” wide.

1. Provide operators with features as follows:

   a. Non-handed with push and pull side mounting.
   b. Operates as mechanical surface closer during close cycles, when door is opened manually or if power is off.
   c. Adjustable spring power, backcheck valve and sweep valve and latch valve.
   d. Activation by push button, hands-free or radio frequency devices.
   e. 24VDC (1.1a) onboard power supply for accessories.
   f. Two-year limited warranty.

2. Operators shall have the following functionality:

   a. Adjustable Hold Open: Amount of time a door will stay in the full open position after an activation.
   b. Obstruction Detection: Door closes if it hits an obstruction while opening. Door will stop once it hits an obstruction and will rest against the obstruction until obstruction is removed.
   c. On/Off Switch: Disables operator activation.
   d. Open Delay: Delays operator opening for locking hardware.
   e. Overload Safety Shut-Off: After two minutes of receiving a door activation signal, inverter times out and door closes to prevent motor/inverter damage.

3. Manufacturers:

   a. LCN 4600
   b. Norton 6000.

B. Electromagnetic Door Holders: ANSI A156.15, Grade 1 electromagnetic door holder/releases with a minimum 25 to 40 pounds holding power and fail-safe operation; power failure releases door to close.

1. Manufacturers:

   a. Norton Rixson (RF) - 900 Series.
   b. Sargent Manufacturing (SA) - 1560 Series.

2.18 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and

provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:

    a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:

    a. Gallery Specialty Hardware (GA)
    b. Rockwood (RO).

2.19 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

    a. Gallery Specialty Hardware (GA)
    b. Rockwood (RO).

2.20 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

E. Manufacturers:

1. Pemko (PE).

F. Switching Power Supplies: Provide the least number of power supplies at the appropriate amperage level sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Power supplies shall meet all functions and features as specified herein.

a. UL listed dual voltage 12 or 24 VDC field selectable continuous output.
b. Tolerates brownout or overvoltage input ± 15% of nominal voltage.
c. Thermal shutdown protection with auto restart.
d. Circuit breaker protection against overcurrent and reverse battery faults.
e. Integrated battery charging circuit to prevent overvoltage on locking devices.
f. Available with a single relay fire trigger or individually triggered relayed outputs.
g. Monitoring options as specified.

2. Manufacturers:

a. Securitron (SU) - AQD Series.

G. Intelligent Switching Power Supplies: Provide the least number of power supplies at the appropriate amperage level sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Power supplies shall meet all functions and features as specified herein.

a. UL listed dual voltage 12 or 24 VDC field selectable continuous output.
b. Dedicated fast charger to prolong battery life with low battery cutoff to protect batteries from deep discharge.
c. Enhanced surge immunity for input/output protection
d. Separate, dedicated battery charging circuit to keep locks cooler.
e. Dual-color LED visual notification to prevent applying incorrect voltages to the power supply.
f. Instant auto-switch to battery on AC loss.
g. Expandable up to 16 outputs in the standard enclosure

h. Integrated fire alarm interface to allow main output shutdown or disconnect on a per output basis when using an R8 output module.
i. Network ready and remotely manage locks and connected devices when using an M8 managed output module on network models.
j. Lifetime replacement, no-fault, no questions asked warranty.

2. Manufacturers:

a. Securitron (SU) - AQL Series.

2.21 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.22 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify the Contract Administrator of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
3. Where indicated to comply with accessibility requirements, comply with “City Of Winnipeg Accessibility Design Standard”
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

B. Fire Door Assembly Inspection: Reference Division 01 Sections "Closeout Procedures". Conduct an initial fire door assembly inspection, including documentation reporting, upon completion of door hardware installation according to NFPA 80 Standard for Fire Doors and Other Opening Protectives, paragraph 5.2.4, requirements.

C. Opening Tags: Provide readable, QR-type label with password protected link-out to Openings Studio™ BIM software suite and the installed door and hardware information. Affix label to door frame as instructed by the Contract Administrator.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of occupancy.

3.7 DEMONSTRATION

A. Instruct the City’s maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the City and Contract Administrator. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the Contract Administrator with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.

2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

Hardware Schedule

Project Name: South Winnipeg Recreation Campus 22007

Hardware Sets – Child Care Center

Set: C00.1
Doors: C121.1, C122.1, C123.1, C124.1, C125.1, C126.1
Description: Child Care Access Doors

2	Hinge, Full Mortise	TA2714 114 x 102mm	652	MK
1	Fiinger Guard	MK1-A (Push Side)	WHT	OT
1	Finger Guard	MK1-B (Pull Side)	WHT	OT
1	Passage Latch	ND10S RHO	626	SC
1	Door Stop	GSH200	626	GA

Set: C00.2
Doors: Fire Shutter 1
Description:

1	Hardware	By Door Supplier		OT

Set: C01.1
Doors: C100
Description:

1	Continuous Hinge	CFM83SLISF-HD1 PT		PE
1	Wire Harness	CON-*** To Suit (Frame)		VO
1	Wire Harness	CON-***To Suit (Door)		VO
1	Electric Power Transfer	EPT10 -CON	689	VO
1	Rim Exit Nightlatch	LX-RX-QEL-35A-NL-OP 388-CON 1220mm	628	VO
1	Rim (FSIC) Cylinder	20-057 -ICX	626	SC
1	Cylinder Core (Permanent)	23-030 (0-Bitted)	626	SC
1	Offset Pull	GSH1180-2 12"	630	GA
2	Actuator Full Height	S-I36-3 Ingress'r	710	OT
1	Auto Operator	4100LE	ALUM	HO
1	Floor Stop	GSH280A	626	GA
1	Perimeter Gasketing	By Door/Frame Provider		OT
1	Door Sweep/Drip Cap	3452APK To Suit Door Width	628	PE
1	Threshold (TB)	252 x 3AFG To Suit Door Width	627	PE
1	Relay	CX-12		CA

1	Card Reader	By Security Contractor		OT
1	Door Contact	By Security Contractor	BLK	OT
1	Pushbutton	PB3A x WCC		SU
1	Power Supply	PS902-2RS		VO

Notes: Free egress at all times. Electronic Latch reraction for momentary/maintained period of time.
Key in outside cylinder retracts latch bolt for manual override.
Valid credential at card reader or signal from access control schedule retacts latch electronically for manual or automatic door operation.
Remote release/Activation of latch retraction by access control, central release located as directed.
Auto Operator by actuator either side, exterior actuator disabled when latch bolt is engaged in strike (LX)
Request to ext signal provided by internal switch in device (RX)

Set: C01.2
Doors: C101
Description:

1	Continuous Hinge	CFM83SLISF-HD1 PT		PE
1	Wire Harness	CON-*** To Suit (Frame)		VO
1	Wire Harness	CON-***To Suit (Door)		VO
1	Electric Power Transfer	EPT10 -CON	689	VO
1	Rim Exit Nightlatch	LX-RX-QEL-35A-NL-OP 388-CON 1220mm	628	VO
1	Rim (FSIC) Cylinder	20-057 -ICX	626	SC
1	Cylinder Core (Permanent)	23-030 (0-Bitted)	626	SC
1	Offset Pull	GSH1180-2 12"	630	GA
2	Actuator Full Height	S-I36-3 Ingress'r	710	OT
1	Auto Operator	4100LE	ALUM	HO
1	Perimeter Gasketing	By Door/Frame Provider		OT
1	Relay	CX-12		CA
1	Card Reader	By Security Contractor		OT
1	Door Contact	By Security Contractor	BLK	OT
1	Intercom	By Security Contractor		OT
1	Power Supply	Shared With Other Openings		OT

Notes: Free egress at all times. Electronic Latch reraction for momentary period of time.
Key in outside cylinder retracts latch bolt for manual override.
Valid credential at card reader or signal from access control/intercom retracts latch electronically for manual or automatic door operation.
Auto Operator by actuator either side, exterior actuator disabled when latch bolt is engaged in strike (LX)
Request to ext signal provided by internal switch in device (RX)

Set: C01.3
Doors: C127, C128, C129
Description:

1	Continuous Hinge	CFM83SLISF-HD1 PT		PE
1	Wire Harness	CON-*** To Suit (Frame)		VO
1	Fiinger Guard	MK1-A (Push Side)	WHT	OT
1	Wire Harness	CON-***To Suit (Door)		VO
1	Electric Power Transfer	EPT2-CON	689	VO

1	Rim Exit Nightlatch	LX-RX-QEL-98-NL-OP -CON 1220mm x 110MD	628	VO
1	Rim (FSIC) Cylinder	20-057 -ICX	626	SC
1	Cylinder Core (Permanent)	23-030 (0-Bitted)	626	SC
1	Offset Pull	GSH1180-2 12"	630	GA
1	Auto Operator	4100LE	ALUM	HO
1	Floor Stop	GSH280A	626	GA
1	Security Astragal	Frontline Defense x Door Height	BLK	OT
1	Head Seal	290APK To Suit Door Width	628	PE
1	Weatherstrip Jamb	319CN To Suit Opening Height (1 pr)	628	PE
1	Door Sweep	315CN To Suit Door Width	628	PE
1	Threshold (TB)	252 x 3AFG To Suit Door Width	627	PE
1	Card Reader	By Security Contractor		OT
1	Door Contact	By Security Contractor	BLK	OT
1	Guard Rail	CE-805 Manitoba Size To Suit	ALUM	OT

Notes: Free egress at all times. Electronic Latch reraction for momentary period of time.
Key in outside cylinder retracts latch bolt for manual override.
Valid credential at card reader or signal from access control retracts latch electronically for manual or automatic door operation.
Auto Operator by actuator either side, exterior actuator disabled when latch bolt is engaged in strike (LX)
Request to ext signal provided by internal switch in device (RX)

Set: C01.4
Doors: C127.1, C127.2, C128.1, C128.2, C129.1, C129.2
Description:

4	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Fiinger Guard	MK1-A (Push Side)	WHT	OT
1	Offset Pull	GSH1180-2 12"	630	GA
1	Push Plate	GSH81A-4"x16"	630	GA
2	Actuator Full Height	S-I36-3 Ingress'r	710	OT
1	Auto Operator	4100LE	ALUM	HO
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Wall Stop	GSH240	626	GA
1	Sound Seal	379BSP PK To Suit Opening	BLK	PE
1	Auto Door Bottom Concealed	411APKL To Suit Door Width		PE

Notes: Push / Pull Operation
Self-closing with optional hold open.

Set: C01.5
Doors: C143
Description:

1	Continuous Hinge	FM300 2134 CTP	630	MR
1	Wire Harness	CON-*** To Suit (Frame)		VO
1	Wire Harness	CON-***To Suit (Door)		VO
1	Electric Power Transfer	EPT10 -CON	689	VO
1	Rim Exit Nightlatch	LX-RX-QEL-98-NL-OP -CON 1220mm x 110MD	628	VO

1	Offset Pull	GSH1180-2 12"	630	GA
2	Actuator Full Height	S-I36-3 Ingress'r	710	OT
1	Auto Operator	4100LE	ALUM	HO
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Floor Stop	GSH280A	626	GA
1	Security Astragal	Frontline Defense x Door Height	BLK	OT
1	Head Seal	290APK To Suit Door Width	628	PE
1	Weatherstrip Jamb	319CN To Suit Opening Height (1 pr)	628	PE
1	Door Sweep	315CN To Suit Door Width	628	PE
1	Threshold (TB)	252 x 3AFG To Suit Door Width	627	PE
1	Card Reader	By Security Contractor		OT
1	Door Contact	By Security Contractor	BLK	OT
1	Guard Rail	CE-805 Manitoba Size To Suit	ALUM	OT
1	Power Supply	PS902-2RS		VO

Notes: Free egress at all times. Electronic Latch reraction for momentary period of time.
Key in outside cylinder retracts latch bolt for manual override.
Valid credential at card reader or signal from access control schedule retracts latch electronically for manual or automatic door operation.
Auto Operator by actuator either side, exterior actuator disabled when latch bolt is engaged in strike (LX)
Request to ext signal provided by internal switch in device (RX)

Set: C01.6
Doors: C143.1
Description:

1	Continuous Hinge	FM300 2134	630	MR
1	Touch Bar	350 1220mm	626	VO
1	Offset Pull	GSH1180-2 12"	630	GA
2	Actuator Full Height	S-I36-3 Ingress'r	710	OT
1	Auto Operator	7100	ALUM	HO
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Wall Stop	GSH240	626	GA
3	Silencer	608-RKW		RO
1	Door Contact	By Security Contractor	BLK	OT

Notes: Push/Pull Operation
Auto operator by actuator either side.

Set: C01.7
Doors: C115.1
Description:

1	Continuous Hinge	CFM83SLISF-HD1 PT		PE
1	Touch Bar	350 1220mm	626	VO
1	Offset Pull	GSH1180-2 12"	630	GA
2	Actuator Full Height	S-I36-3 Ingress'r	710	OT
1	Auto Operator	4100LE	ALUM	HO
1	Floor Stop	GSH280A	626	GA
1	Security Astragal	Frontline Defense x Door Height	BLK	OT
1	Perimeter Gasketing	By Door/Frame Provider		OT
1	Door Sweep/Drip Cap	3452APK To Suit Door Width	628	PE

1	Threshold (TB)	252 x 3AFG To Suit Door Width	627	PE
1	Door Contact	By Security Contractor	BLK	OT
1	Intercom	By Security Contractor		OT
1	Guard Rail	CE-805 Manitoba Size To Suit	ALUM	OT
1	Power Supply	PS902-2RS		VO

Notes: Free egress at all times.
Auto Operator by actuator either side,

Set: C01.8
Doors: C115
Description:

1	Continuous Hinge	CFM83SLISF-HD1 PT		PE
1	Wire Harness	CON-*** To Suit (Frame)		VO
1	Wire Harness	CON-***To Suit (Door)		VO
1	Electric Power Transfer	EPT10 -CON	689	VO
1	Rim Exit Nightlatch	LX-RX-QEL-35A-NL-OP 388-CON 1220mm	628	VO
1	Offset Pull	GSH1180-2 12"	630	GA
2	Actuator Full Height	S-I36-3 Ingress'r	710	OT
1	Auto Operator	4100LE	ALUM	HO
1	Floor Stop	GSH280A	626	GA
1	Security Astragal	Frontline Defense x Door Height	BLK	OT
1	Perimeter Gasketing	By Door/Frame Provider		OT
1	Door Sweep/Drip Cap	3452APK To Suit Door Width	628	PE
1	Threshold (TB)	252 x 3AFG To Suit Door Width	627	PE
1	Door Contact	By Security Contractor	BLK	OT
1	Intercom	By Security Contractor		OT
1	Guard Rail	CE-805 Manitoba Size To Suit	ALUM	OT
1	Power Supply	PS902-2RS		VO

Notes: Free egress at all times. Electronic Latch reraction for momentary period of time.
Key in outside cylinder retracts latch bolt for manual override.
Valid credential at card reader or signal from access control retracts latch electronically for manual or automatic door operation.
Auto Operator by actuator either side, exterior actuator disabled when latch bolt is engaged in strike (LX)
Request to ext signal provided by internal switch in device (RX)

Set: C02.1
Doors: C102
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Classroom Security Lock	ND75PD RHO (0 Bitted)	626	SC
1	Surface Closer	4041 REG DEL (Pull Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Door Stop	GSH200	626	GA
1	Sound Seal	379BSP PK To Suit Opening	BLK	PE
1	Auto Door Bottom Concealed	411APKL To Suit Door Width		PE

Set: C02.2
Doors: C105
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Classroom Lock	ND70PD RHO (0 Bitted)	626	SC
1	Surface Closer	4041 REG DEL (Pull Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Door Stop	GSH218	626	GA
1	Sound Seal	379BSP PK To Suit Opening	BLK	PE
1	Auto Door Bottom Concealed	420APKL To Suit Door Width		PE

Set: C02.3
Doors: C114.1, C141
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Classroom Lock	ND70PD RHO (0 Bitted)	626	SC
1	Surface Closer	4041 REG DEL (Pull Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Door Stop	GSH218	626	GA
1	Smoke Seal	S88BL To Suit Opening	BLK	PE

Set: C02.4
Doors: C117
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Classroom Lock	ND70PD RHO (0 Bitted)	626	SC
1	OH Stop Concealed	6-*36 Size To Suit	630	RF
3	Silencer	608-RKW		RO

Set: C02.5
Doors: C120
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Mortise Deadlock	MS1850S	628	AD
1	Mortise Cylinder	20-013 (0 Bitted)	626	SC
1	T-Turn Cylinder	4066-01	130	AD
2	Offset Pull	GSH1180-2 12"	630	GA
1	Surface Closer	1461 REG (Pull Side)	689	LC
1	Wall Stop	GSH240	626	GA
1	Perimeter Gasketing	By Door/Frame Provider		OT

Set: C02.6
Doors: C121, C122, C123, C124, C125, C126
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Finger Guard	MK1-B (Pull Side)	WHT	OT
1	Classroom Security Lock	ND75PD RHO (0 Bitted)	626	SC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Wall Stop	GSH240	626	GA
1	Sound Seal	379BSP PK To Suit Opening	BLK	PE
1	Auto Door Bottom Concealed	411APKL To Suit Door Width		PE

Set: C02.7
Doors: C131, C132, C133, C134, C135, C136, C137, C138
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Finger Guard	MK1-B (Pull Side)	WHT	OT
1	Classroom Security Lock	ND75PD RHO (0 Bitted)	626	SC
1	OH Stop Concealed	6-*36 Size To Suit	630	RF
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Sound Seal	379BSP PK To Suit Opening	BLK	PE
1	Auto Door Bottom Concealed	411APKL To Suit Door Width		PE

Set: C03.1
Doors: C102.1
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Entrance/Office Lock	ND50PD RHO (0 Bitted)	626	SC
1	Wall Stop	GSH240	626	GA
1	Sound Seal	379BSP PK To Suit Opening	BLK	PE
1	Auto Door Bottom Concealed	411APKL To Suit Door Width		PE

Set: C04.1
Doors: C103
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Classroom Security Lock	ND75PD RHO (0 Bitted)	626	SC
1	Surface Closer	1461 REG (Pull Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Wall Stop	GSH240	626	GA
1	Sound Seal	379BSP PK To Suit Opening	BLK	PE
1	Auto Door Bottom Concealed	411APKL To Suit Door Width		PE

Set: C05.1
Doors: C104, C112, C118, C142, C144
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Storeroom Lock	ND80PD RHO (0 Bitted)	626	SC
1	Surface Closer	1461 REG (Pull Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Door Stop	GSH218	626	GA
3	Silencer	608-RKW		RO

Set: C05.2
Doors: C106
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Storeroom Lock	ND80PD RHO (0 Bitted)	626	SC
1	Surface Closer	1461 REG (Pull Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Door Stop	GSH218	626	GA
1	Smoke Seal	S88BL To Suit Opening	BLK	PE

Set: C05.3
Doors: C113
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Storeroom Lock	ND80PD RHO (0 Bitted)	626	SC
1	Surface Closer	1461 REG (Pull Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Door Stop	GSH218	626	GA
1	Smoke Seal	S88BL To Suit Opening	BLK	PE
1	Auto Door Bottom Concealed	420APKL To Suit Door Width		PE

Set: C06.1
Doors: C107
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Privacy Deadbolt w/Indicator	L9460P 06A XL11-886 L283-722	626	SC
2	Actuator Full Height	S-I36-3 Ingress'r	710	OT
1	Door Operator	4631CS	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Wall Stop	GSH240	626	GA

3	Silencer	608-RKW		RO
1	Monitor	LML-1		SU

Notes: Free egress at all times.
Deadbolt by key outside/thumbturn inside, visual indicator "Occupied/Vacant"
Auto operator by actuator either side, actuators disabled when deadbolt is engaged in strike.

Set: C06.2
Doors: C109.1, C109.2, C109.3
Description:

2	Hinge, Spring	1502 114 x 102mm	652	MK
1	Hinge, Full Mortise	TA2714 114 x 102mm	652	MK
1	Privacy Deadbolt w/Indicator	L9460P 06A XL11-886 L283-722	626	SC
1	Wall Stop	GSH240	626	GA
3	Silencer	608-RKW		RO

Notes: Free egress at all times.
Deadbolt by key outside/thumbturn inside, visual indicator "Occupied/Vacant"

Set: C06.3
Doors: C109.4

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Privacy Deadbolt w/Indicator	L9460P 06A XL11-886 L283-722	626	SC
1	Surface Closer	1461 CUSH DEL (Push Side)	689	LC
3	Silencer	608-RKW		RO

Notes: Free egress at all times.
Deadbolt by key outside/thumbturn inside, visual indicator "Occupied/Vacant"

Set: C07.1
Doors: C109
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Push Plate	GSH81A-4"x16"	630	GA
1	Door Pull	GSH4609-2	630	GA
1	OH Stop Concealed	6-*36 Size To Suit	630	RF
2	Actuator Full Height	S-I36-3 Ingress'r	710	OT
1	Auto Operator	7100	ALUM	HO
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
3	Silencer	608-RKW		RO

Set: C08.1
Doors: C110, C140
Description:

6	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	CV Cable Exit Only	9849-EO-F LBLAFL	626	VO

1	CV Cable Exit Only	9849-EO-F LBL	626	VO
2	Surface Closer	4040XPT-DE Pull Side)	689	LC
2	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
2	Electromagnetic Holder	998M	689	RF
1	Smoke Seal	S88BL To Suit Opening	BLK	PE

Set: C09.1
Doors: C111

6	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Dust Proof Strike	570	626	RO
2	Flush Bolt	GSH401	626	GA
1	Storeroom Lock	ND80PD RHO (0 Bitted)	626	SC
2	OH Stop Concealed	6-*36 Size To Suit	630	RF
1	Surface Closer	4040XP EDA (Push Side)	689	LC
1	Astragal Flat	By Door Supplier		OT
1	Smoke Seal	S88BL To Suit Opening	BLK	PE
2	Auto Door Bottom	4131CRL To Suit Door Width	628	PE

Set: C10.1
Doors: C116

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Fiinger Guard	MK1-A (Push Side)	WHT	OT
1	Mortise Deadlock	MS1850S	628	AD
1	Mortise Cylinder	20-013 (0 Bitted)	626	SC
1	T-Turn Cylinder	4066-01	130	AD
2	Offset Pull	GSH1180-2 12"	630	GA
1	Surface Closer	1461 REG DEL (Pull Side)	689	LC
1	Wall Stop	GSH240	626	GA
1	Perimeter Gasketing	By Door/Frame Provider		OT

Hardware Sets – Recreation Center
Set: R00.2
Doors: Fire Shutter 2
Description:

1	Hardware	By Door Supplier		OT

Set: R01.1
Doors: R100
Description:

1	Mortise Deadlock	MS1851SW 5	628	AD
2	Mortise Cylinder	20-013 (0 Bitted)	626	SC
1	Balance Of Hardware	By Door Supplier		OT

Notes: Free egress at all times.
Automatic Door operation Fully automatic, Sesnors and Actuators by Door Supplier.
MS Lock for after hours security only - Not Permitted during hours of public occupancy.

Set: R01.2
Doors: R101
Description:

1	Card Reader	By Security Contractor		OT
1	Door Contact	By Security Contractor	BLK	OT
1	Balance Of Hardware	By Door Supplier		OT

Notes: Free egress at all times.
Automatic Door operatioFully automatic, Sesnors and Actuators by Door Supplier.

Set: R01.3
Doors: R180
Description:

1	Mortise Deadlock	MS1851SW 5	628	AD
1	Mortise Cylinder	20-013 (0 Bitted)	626	SC
1	T-Turn Cylinder	4066-01	130	AD
2	Actuator Full Height	S-I36-3 Ingress'r	710	OT
1	Balance Of Hardware	By Door Supplier		OT

Notes: Free egress at all times.
Automatic Door operation by actuator either side.
Actuators disabled by power switch on door assembly.
MS Lock for special event security only - Not Permitted during hours of public occupancy.

Set: R01.4
Doors: STA-1, STB-1, STD-1
Description:

1	Continuous Hinge	FM300 2134	630	MR
1	Rim Exit Only x Alarm	ALK XP98-EO	626	VO
1	OH Stop HD Surface	9-*36 Size To Suit	630	RF
1	Surface Closer	4040XP EDA ST-2731	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Security Astragal	Frontline Defense x Door Height	BLK	OT
1	Head Seal	290APK To Suit Door Width	628	PE
1	Weatherstrip Jamb	319CN To Suit Opening Height (1 pr)	628	PE
1	Door Sweep	315CN To Suit Door Width	628	PE
1	Threshold (TB)	252 x 3AFG To Suit Door Width	627	PE
1	Door Contact	By Security Contractor	BLK	OT

Set: R01.5
Doors: STA-1.1, STA-2, STB-2, STC-2, STD-2
Description:

3	Hinge, Full Mortise, Hvy Wt	T4A3786xNRP 127 x 102mm	652	MK
1	Wire Harness	CON-*** To Suit (Frame)		VO
1	Wire Harness	CON-***To Suit (Door)		VO
1	Electric Power Transfer	EPT10 -CON	689	VO
1	Fire Rated Rim Exit	RX2-98-L-F x M996L-06-12VDC-ALK-CON	626	VO
1	Rim Cyl (SFIC)	80-116	626	SC
2	Permanent Cylinder	1C72	626	BE
1	Mortise Cylinder (SFIC-ALK)	80-110	626	SC
1	Surface Closer	4040XP EDA (Push Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Wall Stop	GSH240	626	GA
1	Head Seal	290APK To Suit Door Width	628	PE
1	Weatherstrip Jamb	319CN To Suit Opening Height (1 pr)	628	PE
1	Relay	CX-12		CA
2	Card Reader	By Security Contractor		OT
1	Door Contact	By Security Contractor	BLK	OT
1	Power Supply	By Security Contractor		OT

Notes: Door normally closed and locked.

Push Side (Unsecured Side)
Pressing touchbar retracts latch bolt for egress, touch bar monitored and will sound audible alarm at device.
Valid Credential at card reader disables alarm kit momentarily.

Pull Side (Secured)
Key in outside lever for manual override.
Valid Credential at card reader releases electric trim (Fail Secure)

Set: R01.6
Doors: STB-1.1, STC1.1, STD-1.1
Description:

3	Hinge, Full Mortise, Hvy Wt	T4A3786xNRP 127 x 102mm	652	MK
1	Wire Harness	CON-*** To Suit (Frame)		VO
1	Wire Harness	CON-***To Suit (Door)		VO
1	Electric Power Transfer	EPT2-CON	689	VO
1	Fire Rated Rim Exit Only	RX-98-EO-F-ALK	626	VO
1	Permanent Cylinder	1C72	626	BE
1	Mortise Cylinder (SFIC-ALK)	80-110	626	SC
1	Power Supply	By Security Contractor		OT

Notes: Door normally closed and locked, exit only.

Push Side (Unsecured Side)
Pressing touchbar retracts latch bolt for egress, touch bar monitored and will sound audible alarm at device.
Cylinder in device disarms/arms exit alarm.

Set: R01.7
Doors: STC-1
Description:

1	Continuous Hinge	CFM83SLISF-HD1 PT		PE
1	Rim Exit Only	ALK 35A-EO	628	VO
1	OH Stop HD Surface	9-*36 Size To Suit	630	RF
1	Surface Closer	4040XP EDA ST-2731	689	LC
1	Security Astragal	Frontline Defense x Door Height	BLK	OT
1	Perimeter Gasketing	By Door/Frame Provider		OT
1	Door Sweep/Drip Cap	3452APK To Suit Door Width	628	PE
1	Threshold (TB)	252 x 3AFG To Suit Door Width	627	PE
1	Door Contact	By Security Contractor	BLK	OT

Notes: ** Drop Plate As Required

Set: R02.1
Doors:
Description:

1	Complete Kit	CCS-2-993-CA-1DRKIT To Suit Opening	628	KN
1	Fascia	CC-980 x Opening Width	628	KN
2	End Caps	CC-982	628	KN
2	Flush Pull	C-90B	626	KN

Set: R02.2
Doors: R208, R232
Description:

1	Complete Kit	CCS-2-993-CA-1DRKIT To Suit Opening	628	KN
1	Fascia	CC-980 x Opening Width	628	KN
1	End Caps	CC-982	628	KN
1	Sliding Door Lockset	C-94BL-CT	626	KN

Set: R03.1
Doors: R221, R223
Description:

3	Hinge, Full Mortise, Hvy Wt	T4A3786xNRP 127 x 102mm	652	MK
1	Push Plate	GSH81A-4"x16"	630	GA
1	Door Pull	GSH4609-2	630	GA
2	Actuator Full Height	S-I36-3 Ingress'r	710	OT
1	Auto Operator	4100LE	ALUM	HO
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Wall Stop	GSH240	626	GA
3	Silencer	608-RKW		RO

Set: R04.1
Doors: R152.3, R152.4, R152.5, R152.6

Description:

3	Hinge, Spring	1502 114 x 102mm	652	MK
3	Hinge, Full Mortise	TA2714 114 x 102mm	652	MK
1	Privacy Deadbolt w/Indicator	L9460P 06A XL11-886 L283-722	626	SC
1	Wall Stop	GSH240	626	GA
3	Silencer	608-RKW		RO

Notes: Free egress at all times.
Deadbolt by key outside/thumbturn inside, visual indicator "Occupied/Vacant"

Set: R04.2
Doors: R120, R152.1, R152.2, R220
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Privacy Deadbolt w/Indicator	L9460P 06A XL11-886 L283-722	626	SC
1	Actuator Full Height	S-I36-3 Ingress'r	710	OT
1	Door Operator	4631CS	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Wall Stop	GSH240	626	GA
3	Silencer	608-RKW		RO
1	Monitor	LML-1		SU

Notes: Free egress at all times.
Deadbolt by key outside/thumbturn inside, visual indicator "Occupied/Vacant"
Auto operator by actuator either side, actuators disabled when deadbolt is engaged in strike.

Set: R05.1
Doors: R163, R205, R206, R240
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Storeroom Lock	9K37D 15D	626	BE
1	Surface Closer	1461 REG (Pull Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Door Stop	GSH218	626	GA
1	Smoke Seal	S88BL To Suit Opening	BLK	PE

Set: R05.2
Doors: R107, R161, R202
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Storeroom Lock	9K37D 15D	626	BE
1	Surface Closer	1461 REG (Pull Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Door Stop	GSH218	626	GA
3	Silencer	608-RKW		RO

Set: R05.3
Doors: R160, R204
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Storeroom Lock	9K37D 15D	626	BE
1	Surface Closer	1461 REG DEL (Pull Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Door Stop	GSH218	626	GA
1	Smoke Seal	S88BL To Suit Opening	BLK	PE

Set: R05.4
Doors: R140
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Storeroom Lock	9K37D 15D	626	BE
1	Surface Closer	1461 CUSH DEL (Push Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
3	Silencer	608-RKW		RO

Set: R06.1
Doors: R102, R103, R105, R108, R155, R211
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Storeroom Lock	9K37D 15D	626	BE
1	Electric Strike	1006CS	630	HS
1	Surface Closer	1461 REG (Pull Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Door Stop	GSH218	626	GA
3	Silencer	608-RKW		RO
1	Card Reader	By Security Contractor		OT
1	Door Contact	By Security Contractor	BLK	OT
1	Power Supply	By Security Contractor		OT

Notes: Door is normally closed and locked. Key in outside lever for manual override.
Valid credential at card reader releases electric strike.

Set: R06.2
Doors: R201, R203, R231, R233, R235
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Storeroom Lock	9K37D 15D	626	BE

1	Electric Strike	1006CS	630	HS
1	Surface Closer/Holder	1461 H DEL (Pull Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Door Stop	GSH200	626	GA
1	Sound Seal	379BSP PK To Suit Opening	BLK	PE
1	Auto Door Bottom Concealed	411APKL To Suit Door Width		PE
1	Card Reader	By Security Contractor		OT
1	Door Contact	By Security Contractor	BLK	OT
1	Power Supply	By Security Contractor		OT

Notes: Door is normally closed and locked.
Key in outside lever for manual override.
Valid credential at card reader releases electric strike.
Self Closing with optional hold open.

Set: R06.3
Doors: R164
Description:

1	Continuous Hinge	FM300 2134	630	MR
1	Storeroom Lock	9K37D 15D	626	BE
1	Electric Strike	1006CS	630	HS
1	OH Stop Concealed	6-*36 Size To Suit	630	RF
2	Actuator Full Height	S-I36-3 Ingress'r	710	OT
1	Auto Operator	4100LE	ALUM	HO
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Astragal	3572SP 2134mm		PE
1	Head Seal	290APK To Suit Door Width	628	PE
1	Weatherstrip Jamb	319CN To Suit Opening Height (1 pr)	628	PE
1	Door Sweep	315CN To Suit Door Width	628	PE
1	Threshold (TB)	252 x 3AFG To Suit Door Width	627	PE
1	Relay	CX-12		CA
1	Card Reader	By Security Contractor		OT
1	Door Contact	By Security Contractor	BLK	OT
1	Power Supply	By Security Contractor		OT

Notes: Door is normally closed and locked.
Key in outside lever for manual override.
Valid credential at card reader releases electric strike.
Auto operator by actuator either side, exterior actuator enabled by access control.

Set: R06.4
Doors: R171
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Storeroom Lock	ND80PD RHO (0 Bitted)	626	SC
1	Electric Strike	1500C-LMS	630	HS
2	Actuator Full Height	S-I36-3 Ingress'r	710	OT
1	Auto Operator	7100	ALUM	HO
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA

1	Wall Stop	GSH240	626	GA
1	Smoke Seal	S88BL To Suit Opening	BLK	PE
1	Relay	CX-12		CA
1	Card Reader	By Security Contractor		OT
1	Door Contact	By Security Contractor	BLK	OT
1	Power Supply	By Security Contractor		OT

Notes: Free egress at all times.
Key in outside cylinder retracts latch bolt for manual override.
Valid credential at card reader or signal from access control releases electric strike for manual or automatic door operation.
Auto Operator by actuator either side, exterior actuator enabled by access control.
Request to ext signal provided by internal switch in device (LMS)
Access Control provides schedule.

Set: R07.1
Doors: R109, R110, R112
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Entrance Lock	9K37AB 15D	626	BE
1	Door Stop	GSH200	626	GA
3	Silencer	608-RKW		RO

Set: R08.1
Doors: R106
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Wire Harness	CON-*** To Suit (Frame)		VO
1	Classroom Lock	9K37R 15D	626	BE
1	Electric Strike	1500C-LMS	630	HS
1	Surface Closer	1461 REG (Pull Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Door Stop	GSH200	626	GA
1	Sound Seal	379BSP PK To Suit Opening	BLK	PE
1	Auto Door Bottom Concealed	411APKL To Suit Door Width		PE
1	Relay	CX-12		CA
1	Card Reader	By Security Contractor		OT
1	Door Contact	By Security Contractor	BLK	OT

Notes: Door is normally closed and locked.
Key in outside lever for manual override.
Valid credential at card reader releases electric strike.

Set: R08.2
Doors: R134
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Classroom Lock	9K37R 15D	626	BE

1	Surface Closer	1461 REG (Pull Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Wall Stop	GSH240	626	GA
1	Sound Seal	379BSP PK To Suit Opening	BLK	PE
1	Auto Door Bottom Concealed	411APKL To Suit Door Width		PE

Set: R08.3
Doors: R132, R133
Description:

3	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Classroom Lock	9K37R 15D	626	BE
1	Surface Closer	1461 REG DEL (Pull Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Wall Stop	GSH240	626	GA
3	Silencer	608-RKW		RO

Set: R10.1
Doors: R135, R135.1, R137
Description:

3	Hinge, Full Mortise, Hvy Wt	T4A3786xNRP 127 x 102mm	652	MK
1	Wire Harness	CON-*** To Suit (Frame)		VO
1	Wire Harness	CON-***To Suit (Door)		VO
1	Electric Power Transfer	EPT10 -CON	689	VO
1	Rim Exit Device	RX-98-L x M996L-06-12VDC-CON	626	VO
1	Rim Cyl (SFIC)	80-116	626	SC
1	Permanent Cylinder	1C72	626	BE
1	OH Stop Concealed	1ADJ-*36 Size To Suit	630	RF
1	Surface Closer/Holder	4040XP HEDA (Push Side)	689	LC
1	Kickplate	GSH80A 254mm x 38mm LDW BEV CSK	630	GA
1	Sound Seal	379BSP PK To Suit Opening	BLK	PE
1	Auto Door Bottom Concealed	411APKL To Suit Door Width		PE
1	Card Reader	By Security Contractor		OT
1	Door Contact	By Security Contractor	BLK	OT
1	Power Supply	By Security Contractor		OT

Notes: Free egress at all times.
Key in outside cylinder retracts latch bolt for manual override.
Valid credential at card reader or signal from access control releases outside trim electronically for manual door operation.
Request to ext signal provided by internal switch in device (RX)
Self Closing with optional hold open.

Set: R11.1
Doors: R236
Description:

6	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Dust Proof Strike	570	626	RO
2	Flush Bolt	GSH401	626	GA
1	Storeroom Lock	9K37D 15D	626	BE
2	OH Stop Concealed	6-*36 Size To Suit	630	RF
1	Surface Closer	4040XP EDA (Push Side)	689	LC
1	Astragal Flat	By Door Supplier		OT
2	Silencer	608-RKW		RO

Set: R11.2
Doors: R139
Description:

6	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Dust Proof Strike	570	626	RO
2	Flush Bolt	GSH401	626	GA
1	Classroom Lock	9K37R 15D	626	BE
2	OH Stop Concealed	1ADJ-*36 Size To Suit	630	RF
2	Surface Closer/Holder	4040XP HEDA (Push Side)	689	LC
1	Astragal Flat	By Door Supplier		OT
2	Silencer	608-RKW		RO

Notes: Self Closing with Optional Hold Open

Set: R11.3
Doors: R162
Description:

5	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Hinge, Full Mortise	TA2714 CC8 127 x 102mm	US26D	MK
1	Wire Harness	CON-*** To Suit (Frame)		VO
1	Wire Harness	CON-***To Suit (Door)		VO
1	Dust Proof Strike	570	626	RO
1	Flush Bolt (Latching)	2845	626	RO
1	Storeroom Lock	9K37D 15D	626	BE
1	Electric Strike	1500C-LMS	630	HS
1	Coordinator	2600 To Suit Opening	628	RO
2	Mounting Bracket	2601AB	628	RO
2	OH Stop Concealed	6-*36 Size To Suit	630	RF
2	Surface Closer	4040XP EDA (Push Side)	689	LC
2	Kickplate	GSH80A 254mm x 25mm LDW BEV CSK	630	GA
1	Astragal Flat	By Door Supplier		OT
1	Smoke Seal	S88BL To Suit Opening	BLK	PE
2	Auto Door Bottom	4131CRL To Suit Door Width	628	PE
1	Card Reader	By Security Contractor		OT
2	Door Contact	By Security Contractor	BLK	OT
1	Power Supply	By Security Contractor		OT

Notes: Door normally closed and locked, Free egress at all times.
Key in outside cylinder retracts latch bolt for manual override.
Valid credential at card reader releases electric strike for manual or automatic door operation.
Request to ext signal provided by internal switch in device (LMS)

Set: R11.4
Doors: R162.1
Description:

2	Continuous Hinge	FM300 2134	630	MR
1	Dust Proof Strike	570	626	RO
2	Flush Bolt	GSH401	626	GA
1	Storeroom Exit Lock	ND25x80BD-XN12-005 RHO x 14-042	626	SC
1	Permanent Cylinder	1C72	626	BE
2	OH Stop Concealed	1ADJ-*36 Size To Suit	630	RF
2	Surface Closer/Holder	4040XP HEDA (Push Side)	689	LC
2	Kickplate	GSH80A 254mm x 25mm LDW BEV CSK	630	GA
1	Astragal	3572SP 2134mm		PE
1	Weatherstrip Jamb	319CN To Suit Opening Height (1 pr)	628	PE
2	Door Sweep	315CN To Suit Door Width	628	PE
1	Threshold (TB)	252 x 3AFG To Suit Door Width	627	PE
2	Door Contact	By Security Contractor	BLK	OT

Notes: Exit Only, key in cylinder (inside room) retracts latch bolt, blank outside plate.
Self closing with optional hold open.

Set: R11.5
Doors: R104
Description:

6	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Dust Proof Strike	570	626	RO
1	Flush Bolt (Latching)	2845	626	RO
1	Storeroom Lock	9K37D 15D	626	BE
1	Coordinator	2600 To Suit Opening	628	RO
2	Mounting Bracket	2601AB	628	RO
2	OH Stop Concealed	6-*36 Size To Suit	630	RF
2	Surface Closer	4040XP EDA (Push Side)	689	LC
2	Kickplate	GSH80A 254mm x 25mm LDW BEV CSK	630	GA
1	Astragal Flat	By Door Supplier		OT
1	Smoke Seal	S88BL To Suit Opening	BLK	PE
2	Auto Door Bottom	4131CRL To Suit Door Width	628	PE

Notes: Door normally closed and locked, Free egress at all times.
Key in outside cylinder retracts latch bolt for manual override.

Set: R11.6

Doors: R102.1, R234
Description:

6	Hinge, Full Mortise	TA2714 127 x 102mm	652	MK
1	Dust Proof Strike	570	626	RO
2	Flush Bolt	GSH401	626	GA
1	Classroom Lock	9K37R 15D	626	BE
2	OH Stop Concealed	6-*36 Size To Suit	630	RF
2	Silencer	608-RKW		RO

Notes:

Set: R11.7
Doors: R135.2, R135.3, R135.4, R135.5
Description:

2	Pivot Set	195	626	RF
1	Dust Proof Strike	570	626	RO
2	Flush Bolt	GSH401	626	GA
1	Classroom Lock	9K37R 15D	626	BE
2	OH Stop Concealed	6-*36 Size To Suit	630	RF
2	Silencer	608-RKW		RO

Notes:

Set: R12.1
Doors: R181, R183, R183.1, R184, R185, R185.1
Description:

6	Hinge, Full Mortise, Hvy Wt	T4A3786xNRP 127 x 102mm	652	MK
2	Surface Bolt	GSH70T/B	630	GA
1	Mortise Deadlock	L463BDC x10-078	626	SC
1	Permanent Cylinder	1C72	626	BE
2	OH Stop Concealed	1ADJ-*36 Size To Suit	630	RF
2	Surface Closer/Holder	4040XP HEDA (Push Side)	689	LC
2	Kickplate	GSH80A 254mm x 25mm LDW BEV CSK	630	GA
1	Astragal Flat	By Door Supplier		OT
2	Silencer	608-RKW		RO

Set: R14.1
Doors: R180.1, R180.2, R180.3, R210, R210.1, R210.2
Description:

1	Continuous Hinge	CFM83SLISF-HD1 PT		PE
1	Rim Exit Nightlatch	CDSI 35A-NL-OP x 388	626	VO
1	Rim Cyl (SFIC)	80-116	626	SC
1	Permanent Cylinder	1C72	626	BE
1	Mortise Cylinder (SFIC-ALK)	80-110	626	SC
1	Electric Strike	9600-LBM	630	HS
2	Offset Pull	GSH1180-2 12"	630	GA
1	OH Stop Concealed	6-*36 Size To Suit	630	RF

1	Actuator Full Height	S-I36-3 Ingress'r	710	OT
1	Auto Operator	7100	ALUM	HO
1	Perimeter Gasketing	By Door/Frame Provider		OT

Notes: Free egress at all times.
Door normally unlocked and closed.
Cylinder Dogging with Visual Indicator for maintained latch retraction.
Auto Operator by actuator either side, exterior actuator disabled when latch is engaged in strike,

Set: R14.2
Doors: R180.4
Description:

2	Continuous Hinge	CFM83SLISF-HD1 PT		PE
1	CV Cable Exit Only	CDSI -3549A-EO LBL	626	VO
1	CV Cable Nightlatch	LX-CDSI 3549A-NL-OP x 388 LBL	626	VO
1	Rim Cyl (SFIC)	80-116	626	SC
3	Permanent Cylinder	1C72	626	BE
2	Offset Pull	GSH1180-2 12"	630	GA
2	Surface Closer	4040XP EDA (Push Side)	689	LC
1	Perimeter Gasketing	By Door/Frame Provider		OT
1	Threshold	151A x Opening Width		PE

Notes: Free egress at all times.
Door normally unlocked and closed.
Cylinder Dogging with Visual Indicator for maintained latch retraction.
Auto Operator by actuator either side, exterior actuator disabled when latch is engaged in strike,

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Glass and glazing.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Show details of each type of glazing system in conjunction with the framing system indicating type of glass, sizes, shapes, glazing material and quantity. Show details indicating glazing material, glazing thickness, bite on the glass and glass edge clearance.

.2 For glass scheduled or indicated as engineered and glass to serve as guards in accordance with building code, shop drawings to be engineered shop drawings. Refer also to Section 08 88 00 for requirements of glass guards.

.3 Indicate analysis of glass including maximum deflection and allowable stresses from imposed dead/live loads and thermal loads.

.4 Samples:

.1 Submit minimum 305 mm (12") square samples of each type of glass indicated or scheduled, except for clear monolithic glass Materials.

.1 Submit 3 control samples for each glass type showing maximum range of visible difference between units for the project.

.2 Submit samples of glass showing each type of shape and finish of glass edge for exposed glass edges.

.2 Submit minimum 305 mm (12") square samples of each type of IGU indicated or scheduled.

.1 Submit 3 control samples for each glass type showing maximum range of visible difference between units.

.3 Submit 305 mm (12") long samples for each type of sealant or gasket exposed to view and for each color required, except black.

.5 Test and evaluation reports:

.1 Obtain compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealant as well as other glazing materials including insulating units.

.2 Submit valid independent laboratory test reports for the various glass and glazing assemblies in coordination with the specified aluminum framed glazing systems demonstrating compliance with specified acoustic performance values in accordance with recognized industry standards and specified performance requirement specified in this section.

.1 Test reports shall be recent and produced with the past 5 years.

.6 Manufacturer reports:

.1 Submit glass fabricator's Material information and structural calculations indicating compliance with glazing standards established by the National Glass Association (NGA) with the Glass Association of North America (GANA). Submittal to include thermal stress and structural load analysis of the proposed glass types, configuration and sizes.

.7 Submit sample glazing warranty.

.8 Submit letter from insulating glass unit fabricator that insulating glass units supplied will bear the certification mark of IGMAC or IGCC/IGMA.

.9 For heat soaked glass submit the following:

.1 A copy of the glass fabricator heat soaking oven calibration certificate indicating the date of the most recent calibration test and inspection;

.2 Heat soaking process control documentation (i.e., temperature control and time of holding phase) relating to calibrated heat soak programs; a separate printout shall be provided for each batch of heat soaked tempered glass produced for the project and the stillage loading rate and glass thickness shall be clearly marked on the printout;

.3 A "Declaration of Conformance" certificate in accordance with DIN EN 14179-2:2005 for each batch of heat soaked tempered glass produced for the project; and

.4 A fragmentation testing results log indicating test results for each batch of tempered glass both before and after heat soaking.

.10 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit maintenance and cleaning instructions for glass and glazing for incorporation into the operating and maintenance manuals.

1.5 Quality Assurance

.1 Qualifications:

.1 Manufacturers: manufacturers shall have a minimum of 10 years of fabrication experience.

.2 Installers / applicators / erectors:

.1 Subcontractor:

.1 Shall be thoroughly trained and experienced in skills required.

.2 Shall be completely familiar with referenced standards and requirements of the work of this section.

.3 Shall personally direct installation performed under this section.

.2 Foreperson experience: Shall have 10 years' experience, minimum, as glazing mechanic.

.3 Glazing mechanic experience: Shall have 3 years' experience, minimum, as glazers.

.4 Structural sealant glazing mechanic experience: Shall have 5 years' relevant experience, minimum.

.5 Mirror installations: Installation only by applicator trained and approved by adhesive manufacturer for application of its Materials.

.2 Mock-ups: in accordance with Section 08 44 00.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 General extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 5 years.

.2 Special product warranty for laminated glass Materials:

.1 Warranty shall cover deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions. Warranty shall be manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units.

.2 Duration: 5 years from date of manufacture for laminated glass.

.3 Special product warranty for tempered glass Materials:

.1 Warrant that tempered glass will not break spontaneously as a result of Nickel Sulfide (NiS) inclusions at a rate exceeding 0.8% (8/1000) for a period of five years from the date of manufacture. Warranty shall be manufacturer's standard form in which tempered-glass manufacturer agrees to replace tempered-glass units.

.2 Duration: 5 years from date of manufacture for fully tempered glass.

.4 Special product warranty for ceramic frit coat glass Materials:

.1 Warranty shall cover deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions. Warranty shall be manufacturer's standard form in which ceramic frit coated-glass manufacturer agrees to replace ceramic frit coated-glass units.

.2 Duration: 5 years from date of manufacture for ceramic frit coated glass.

.5 Special product warranty for acid etched frit glass Materials:

.1 Warranty shall cover deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions. Warranty shall be manufacturer's standard form in which acid etched frit glass manufacturer agrees to replace acid etched frit glass units.

.2 Duration: 10 years from date of manufacture for acid etched frit glass.

.6 Special product warranty for heat soaked tempered glass Materials:

.1 Warrant that heat soaked tempered glass will not break spontaneously as a result of Nickel Sulfide (NiS) inclusions at a rate exceeding 0.5% (5/1000) for a period of five years from the date of manufacture. Warranty shall be manufacturer's standard form in which heat soaked-glass manufacturer agrees to replace heat soaked-glass units.

.2 Duration: 5 years from date of manufacture for fully tempered glass that has been heat soaked.

.7 Special product warranty for insulating glass units:

.1 Provide a written warranty from date of manufacture for sealed insulating glass units. Warranty shall cover the following:

.1 Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.

.2 Duration: 10 years.

.8 Special product warranty for mirror glass Materials:

.1 Provide a written warranty from date of manufacture for mirror silvering. Warranty shall cover the following:

.1 Deterioration due to normal conditions of use and not to handling, installing, protecting and maintaining practices contrary to the glass manufacturer's published instructions.

.2 Replacement of mirror glass units.

.3 Duration: 10 years.

.9 Special product warranty for spandrel glass Materials:

.1 Provide a written warranty from date of manufacture of spandrel glass Material. Warranty shall cover the following:

.1 Deterioration due to normal conditions of use and not to handling, installing, protecting and maintaining practices contrary to the glass manufacturer's published instructions.

.2 Spandrel glass coating will not flake, peel, chip, blister, or develop any colour change.

.3 Replacement of spandrel glass units.

.4 Duration: 10 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 General:

.1 Publications: Comply with recommendations in the publications below, except where more stringent requirements are specified or indicated. Refer to these publications for glazing terms not otherwise defined in this section.

.1 NGA's GANA Glazing Manual.

.2 NGA Engineering Standards Manual.

.3 NGA Laminated Glazing Reference Manual.

.4 GANA Sealant Manual.

.2 Regulatory requirements:

.1 Fire rated glass:

.1 Each lite shall bear permanent, non-removable label by accredited and recognized independent testing agency certifying it for use in tested and rated fire protective assemblies.

.3 Glass strength:

.1 Design glass in conformance with the building code and under conditions indicated determined in accordance with ASTM E1300-16 and the following requirements:

.1 Minimum thickness of annealed or heat-treated glass Materials to be selected so the worst case probability of failure does not exceed the following:

.1 8 breaks per 1000 for glass installed vertically less than 15 degrees from the vertical plane and under wind action.

.2 1 break per 1000 for glass guards and railings.

.3 5 breaks per 1000 for heat soaked tempered glass as a result of verifiable NiS inclusion.

.2 Maximum lateral deflection:

.1 Limit centre-of-glass deflection at design wind pressure to not more than L/60 or 19 mm (3/4"), whichever is less, where L=short panel length.

.2 Glass at guards, balustrades, and where glass is likely to be subjected to human impact shall comply with safety glass requirements of CAN/CGSB 12.20-M89 and CAN/CGSB 12.1-2017, DIN EN 14179-1:2005, where applicable, and building code.

.3 Provide annealed, heat strengthened, and tempered lights where required by the building code, and where required for the various solar exposures on the building.

.4 Glass thicknesses and glass types specified, indicated, or scheduled in the Contract Documents are minimums required. Modify glass thickness as required to satisfy design and building code requirements, and requirements of authorities having jurisdiction, and any such modifications shall be clearly indicated on shop drawings.

.4 Energy performance: in accordance with the following:

.1 The Glazing & Screen Schedule.

.2 Section 08 42 29.

.3 Section 08 44 00.

.4 Section 08 54 13.

.5 Provide glass Materials of uniform appearance, reflectivity, hue, shade, visible light transmittance, and colour when viewed from distance of 3 m (10 ft) to 30 m (100 ft) perpendicular to the glass or from 45 degree angle to the glass.

.6 Protect laminated glass interlayer from damage or discolouration resulting from contact with deleterious and incompatible sealants, substances, and materials. Comply with manufacturer’s recommended installation requirements.

.7 Glazing within 2440 mm of a floor shall be tempered.

2.3 Performance/Design Requirements - Acoustic

.1 Design glass and glazing units in conjunction with aluminum framed glazing systems and related assemblies to provide the indicated sound transmission class (STC) as indicated on the drawings when tested to ASTM E90-09.

2.4 Glass Manufacturers

.1 Subject to compliance with the requirements of the Contract Documents, provide primary glass by one of the following float glass manufacturers:

.1 Cardinal Glass Industries.

.2 Guardian Industries, LLC.

.3 Pilkington North America.

.4 Vitro Architectural Glass.

2.5 Glass Materials

.1 General:

.1 Single source responsibility:

.1 Coated glass and tinted glass; for each type and condition required:

.1 Provide primary glass obtained from a single source and plant.

.2 Provide coating obtained from single source.

.2 Provide each type of glazing accessory from a single manufacturer or fabricator and from a single production run.

.2 Insulating glass units:

.1 Warm edge, hermetically sealed, in accordance with CAN/CGSB 12.8-97 or with ASTM E2190-10, minimum 12 mm (1/2") 90% argon/10% air filled, primary seal shall be polyisobutylene, secondary seal shall be polysulphide or silicone, warm edge spacer shall contain desiccant.

.1 Warm edge spacer:

.1 Hybrid type polypropylene faced, stainless steel.

.2 Basis of design: Technoform ‘SP14’.

.1 Spacer bar colour: Black.

.2 Grey coloured polyisobutylene shall not be acceptable.

.3 Edge delete low-E coating down to bare glass in accordance with manufacturer’s written requirements. Deletion shall be continuous around the entire periphery of glass edges to minimum deletion width from edge of glass to at least 50% through the primary sealant bead width.

.4 Set spacer bar evenly into glass units to maximum variation of +/- 2.0 mm (0.080”)/length of spacer bar. Primary sealant shall not extend past spacer bar greater than 1.5 mm (0.060”).

.5 IGMAC or IGCC/IGMA certified, permanently marked either on spacers or on at least one component lite of units with appropriate certification label.

.6 Glass thickness: 6 mm (1/4") minimum, and as required to suit design requirements.

.7 Glass colour: clear, unless otherwise indicated.

.1 Low-E coating:

.1 Acceptable Materials: as indicated on the Glazing & Screen Schedule.

.3 Annealed (float) glass:

.1 Clear, annealed glass, 6 mm (1/4") thick minimum, in accordance with CAN/CGSB 12.3-M91, Glazing Quality, or with ASTM C1036-21, Type I, Class 1 (clear), Quality-Q3.

.4 Heat treated (tempered or heat strengthened) float glass:

.1 In accordance with CAN/CGSB 12.1-2017 or with ASTM C1048-18, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

.2 Minimum thickness: 6 mm (1/4").

.3 Fabrication process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

.4 For uncoated glass, comply with requirements for Condition A in accordance with ASTM C1048-18.

.5 For coated vision glass, comply with requirements for Condition C (other coated glass) in accordance with ASTM C1048-18.

.6 Heat strengthened glass shall have surface compression of 24-52 MPa (3,500-7,500 psi).

.7 Heat soaked tempered glass:

.1 In accordance with DIN EN 14179-1:2005.

.2 Label heat soaked tempered glass consistent with tempered glass mark. Markings shall be visible and legible when the guard is installed.

.5 Laminated glass:

.1 In accordance with CAN/CGSB 12.1-2017 or with ASTM C1172-19.

.2 Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations. Use materials that have a proven record of no tendency to bubble, discolour, or lose physical and mechanical properties after fabrication and installation.

.1 At exterior applications where glass edges are not protected from contact or are otherwise not protected from direct exposure to weather:

.1 Acceptable Materials:

.1 Kuraray America, Inc. ‘SentryGlas Ionoplast’ interlayer.

.2 Saflex ‘DG41’ interlayer.

.2 At interior applications:

.1 Acceptable Materials: to meet performance requirements in Glazing & Screen Schedule.

.3 Glass layers minimum 6 mm (1/4") thick unless otherwise indicated.

.4 Interlayer thickness: Provide thickness as needed to comply with requirements and not less than the following:

.1 Vertical glazing: not less than 0.76 mm (0.030") unless otherwise indicated.

.5 Interlayer colour: Clear unless otherwise indicated.

.6 Glass type: annealed or heat strengthened or tempered, as required to suit design requirements.

.7 Laminated glass Materials to be fabricated free of foreign substances and air or glass pockets in autoclave with heat plus pressure.

.6 Mirrors (MIR1):

.1 Annealed glass, to ASTM C1503-08(2013) as follows:

.2 Grade: Mirror Cut Size.

.3 Quality: Mirror Select Quality, except allowable distortion shall be ≥ 80° vision interference angle in accordance with ASTM C1036-21 Table 5.

.4 Colour: Clear.

.5 Thickness: 6 mm (1/4").

.6 Exposed edges shall be chamfered, ground, and polished.

.7 Ceramic frit coated glass (ceramic ink):

.1 In accordance with ASTM C1048-18 Standard Specification for Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated, Condition B.

.2 Silk-screen pattern should be no more than 1.59 mm (0.0625") off parallel from locating glass edge and no more than 0.32 mm (0.0125") from edges other than locating glass edge.

.3 There shall be a maximum of a 0.79 mm (0.03125") variation in dot, hole or line location.

.4 Pattern: in accordance with CSA A460-19.

.5 Colour: to later selection by Contract Administrator from manufacturer's standard range.

.6 Acceptable manufacturers:

.1 Cardinal.

.8 Acid-etched frit glass:

.1 Satin acid etch (treated by liquid acids) on surface as indicated on the Glazing & Screen Schedule. Etching to be approved by Contract Administrator.

.2 Pattern: in accordance with CSA A460-19.

.3 Acceptable manufacturers:

.1 Guardian.

.9 Silicone-coated spandrel glass:

.1 Glass treatment:

.1 Heat strengthened float glass, unless otherwise indicated on the Glazing & Screen Schedule.

.2 Thickness: 6 mm (1/4") minimum thickness.

.3 Coating location: Surface four, unless otherwise indicated on the Glazing & Screen Schedule.

.4 Fallout resistance: Passes fallout-resistance test in ASTM C1048-18 for an assembly of glass and adhered reinforcing material.

.5 One component, water-based silicone coating supplied as flowable, thixotropic emulsion.

.1 Colour: Custom colour to later selection by the Contract Administrator.

.6 Acceptable silicone spandrel coating Material:

.1 Industrial Control Development Inc 'Opaci-Coat-300'.

2.6 Fire-Rated Glass

.1 Fire-protective rated, impact safety resistant glass, non-wired:

.1 In accordance with CAN/ULC S104/106, CPSC 16 CFR 1201 (Cat. I and II).

.2 Film faced and non-film faced glazing:

.1 Fire-protective-rated and impact safety-rated, transparent glazing material and listed for use in doors, sidelites, transoms, and borrowed lites in both interior and exterior applications, not functioning as a barrier.

.2 Surface finish:

.1 Premium Grade: transparent glass, polished for superior optical clarity.

.3 Acceptable Materials:

.1 Safti First 'SuperLite II-XL'.

.2 Saint Gobain 'Keralite Select F'.

.3 Schott 'Pyran Platinum F'.

.4 Technical Glass Products 'FireLite NT'.

.3 Non-film faced glazing:

.1 Fire-protective-rated and impact safety-rated, transparent glazing material with no exposed film facing, and listed for use in doors, sidelites, transoms, and borrowed lites in both interior and exterior applications, not functioning as a barrier to heat.

.2 Surface finish:

.1 Premium Grade: transparent glass, polished for superior optical clarity.

.3 Acceptable Materials:

.1 Safti First 'SuperLite II-XL'.

.2 Saint Gobain 'Keralite Select L'.

.3 Schott 'Pyran Platinum L'.

.4 Technical Glass Products 'FireLite Plus'.

2.7 Glazing Materials (Non-Fire Rated)

.1 Glazing materials; general: Select glazing sealants, tapes, gaskets and additional glazing materials of proven compatibility with other materials they will contact, including glass Materials, seals of insulating glass units and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.

.2 Glazing gaskets: Moulded or extruded gaskets of profile and hardness required to maintain watertight seal, made from the following:

.1 Except at silicone glazing: preformed, EPDM to ASTM C864-05(2019).

.2 At silicone glazing: preformed silicone to ASTM C1115-17(2022).

.3 Setting blocks: Moulded or extruded material with Shore, Type A Durometer hardness of 85, plus or minus 5, made from the following:

.1 Except at silicone glazing: preformed, EPDM to ASTM C864-05(2019).

.2 At silicone glazing: preformed silicone to ASTM C1115-17(2022).

.4 Spacers: Moulded or extruded blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated made from the following:

.1 Except at silicone glazing: preformed, EPDM to ASTM C864-05(2019).

.2 At silicone glazing: preformed silicone to ASTM C1115-17(2022).

.5 Edge blocks: Moulded or extruded material of hardness needed to limit glass lateral movement (side walking) made from the following:

.1 Except at silicone glazing: preformed, EPDM to ASTM C864-05(2019).

.2 At silicone glazing: preformed silicone to ASTM C1115-17(2022).

.6 Cleaners, primers and sealers: Type recommended by sealant or gasket manufacturer.

.7 Polyurethane foam glazing tape:

.1 High density, closed-cell, flexible, non-extruding tape, adhesive backed one side only; recommended by manufacturer for exterior applications with nominal pressure in glazing channel.

.2 Acceptable Materials: As recommended by manufacturer suitable for conditions of application and use.

.8 Mirror clips:

.1 Clear anodized aluminum channels at top and bottom:

.1 Acceptable Material:

.1 CR Laurence ‘Satin Anodized Canadian Style 1/4" Deep "J" Channels’.

.9 Mirror adhesive:

.1 Acceptable Material:

.1 Palmer ‘Mirro-Mastic’, complete with sealer as required.

.10 Butt joint glazing sealant:

.1 Medium-modulus, neutral-curing silicone sealant; complying with ASTM C920-18, Type S, Grade NS, Application G, Class 25.

.2 Colour: as selected by Contract Administrator from full colour range.

.3 Acceptable Materials:

.1 DOWSIL '999-A'.

.2 Momentive 'SCS1200'.

.3 Pecora '860'.

.4 Tremco 'Proglaze'.

2.8 Glazing Materials (Fire Rated)

.1 Glazing tape; fire-rated glass (non-wired):

.1 Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to effect an air and vapour seal.

.2 Silicone sealant: One-part neutral curing silicone, medium modulus sealant, to ASTM C920-11, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable.

.1 Acceptable Materials:

.1 DOWSIL '795'.

.2 Momentive 'Silglaze-II 2800'.

.3 Tremco 'Spectrem 2'.

.3 Setting blocks: Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness, adhesive-backed on one face only, tested for compatibility with specified glazing compound.

.4 Cleaners, primers, and sealers: Type recommended by manufacturer of glass and gaskets.

2.9 Fabrication of Glazing Units

.1 Fabricate glazing units in sizes required to fit openings, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of Material manufacturer and referenced glazing publications, to comply with system performance requirements.

.1 Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

.2 Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

.3 Grind smooth and chamfer, and polish exposed glass edges and corners, unless otherwise indicated.

PART 3 - EXECUTION

3.1 Examination

.1 Examine framing, glazing channels, and stops, with glazing installer present, for compliance with the following:

.1 Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.

.2 Inspect butt and mitre joints in framing. Seal joints found to be open with a compatible sealant prior to glazing.

.3 Glazing pockets and surfaces are free of dust, construction debris, and contaminants.

.4 Presence and functioning of weep systems.

.5 Minimum required face and edge clearances in accordance with FGIA and NGA/GANA standards.

.6 Effective sealing between joints of glass-framing members.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Preparation

.1 Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

.2 Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

.3 Clean contact surfaces with solvent and apply primers to surfaces to receive tapes and sealants in accordance with the manufacturer's requirements. Ensure surfaces are free of moisture and frost.

3.3 Glazing - General

.1 Comply with combined written requirements of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

.2 Adjust glazing channel dimensions as required by conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

.3 Protect glass edges from damage during handling and installation. Remove damaged glass from project site and legally dispose of off project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

.4 Clean glazing rebate surfaces of traces of dirt, dust, or other contaminants.

.5 Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

.6 Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

.7 Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

.8 Provide spacers for glass lites where length plus width is greater than 1270 mm (50").

.1 Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

.2 Provide 3.2 mm (1/8") minimum bite of spacers on glass and use thickness equal to sealant width.

.9 Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel.

.10 Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

.11 Set glass lites with proper orientation so that coatings face exterior or interior as specified.

.12 Glaze hollow metal doors and frames specified under work of Section 08 11 13 using tape glazing installation.

.13 Install fire rated glazing in accordance with fire rated glazing Material manufacturer's written requirements and with current fire-resistance listing for each Material. Field cutting or tampering is not permissible.

3.4 Tape Glazing

.1 Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

.2 Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

.3 Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

.4 Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

.5 Do not remove release paper from tape until right before each glazing unit is installed.

.6 Centre glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centres of openings.

3.5 Gasket Glazing (Dry)

.1 Allow gaskets to relax and cut compression gaskets to lengths recommended by gasket manufacturer to fit openings to suit frame dimensions.

.2 Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

.3 Installation with drive-in wedge gaskets: Centre glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centres of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

.4 Installation with pressure-glazing stops: Centre glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

.5 Install gaskets so they protrude past face of glazing stops.

3.6 Sealant Glazing (Wet)

.1 Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

.2 Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

.3 Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 Installation - Mirrors

.1 Provide frameless mirrors only. Grind and polish exposed mirror edges.

.2 Mount mirrors in true planes, free of distortions. Surfaces of butted mirrors shall be flush to ≤ 1 mm (0.04"). Mirror installation shall be flat to within 1.5 mm in 1220 mm (1/16" in 4 ft).

.3 Locate joints in mirrors at maximum available mirror sizes to Contract Administrator's direction, unless otherwise indicated. Provide butt joints with flat ground and polished edges to provide inconspicuous joint complete with black tape behind joint to hide wall substrate.

.4 Mirror clip support installation:

.1 Secure mirrors in place over pressure sensitive foamed plastic tape with metal clips. Locate clips at not more than 914 mm (36") on centre on top and bottom edges of mirrors.

.2 Secure mirrors in place over pressure sensitive foamed plastic tape with bottom metal channels and top clips. Locate clips at not more than 914 mm (36") on centre on top and bottom edges of mirrors.

.3 Secure mirrors in place over pressure sensitive foamed plastic tape with top and bottom metal channels and top clips. Locate clips at not more than 914 mm (36") on centre on top and bottom edges of mirrors.

.5 Mastic adhesive and top and bottom support clip installation:

.1 Secure mirrors in place over mastic adhesive with metal clips. Locate clips at not more than 914 mm (36") on centre on top and bottom edges of mirrors.

.2 Make sure mirror and substrate are free of dust, clean, and dry. On nonporous substrates, such as glass, tile, or metal, sealing is not necessary. On porous substrates, such as drywall or wood, use Mirro-Mastic Bond (or a primer or sealer, not paint) on the substrates and allow it to dry. Painted surfaces should be sanded through to the original surface and the substrate cleaned and sealed where the mastic is to be applied.

.3 Support mirror at the bottom using concealed bottom angles.

.4 Apply mirror adhesive to the mirror or substrate in a minimum of 1 ping-pong ball size mound for every 0.0929 m^2 (1 ft^2) of mirror. Do not apply mastic too close to the edge to prevent "squeeze out". Place the mounds so space will be left between them when the mirror is installed. Mastic adhesive shall be at room temperature (22°C).

.5 Press mirror firmly in place making good contact between the mirror, mastic, and substrate. Mastic should spread to a pat approximately 114 mm (4-1/2”) in diameter. The mastic needs air circulation to cure properly. Curing time will depend on temperature, humidity, type of substrate, and amount of air that can reach the mastic.

3.8 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.1 Field tests and inspections:

.1 Non-destructive polarimetry surface compression tests on heat strengthened and tempered glass in accordance with ASTM C1048-18.

.2 Manufacturer’s field review to be in accordance with Section 01 45 00.

3.9 Adjusting and Cleaning

.1 Immediately remove sealant and compound droppings from finished surfaces. Remove labels after work is completed.

.2 Final cleaning of glass in accordance with Section 01 74 00.

END OF SECTION

Exterior Vision Glazing in Aluminum Curtainwall				
GL1	**Exterior - IGU - Triple Glazed**			
Assembly	Exterior Lite	6mm	Clear Float	Heat Stengthened
	Coatings	Surface #1: Guradian Acid Etch Bird Protective Pattern		
	Coatings	Surface #2: :Low-e coating - Guradian SNX 70+		
	Air Space	12mm	Argon Filled	High performance warm edge spacer, black
	Middle Lite	6mm	Clear Float	Annealed
	Air Space	12mm	Argon Filled	High performance warm edge spacer, black
	Interior Lite	6mm	Clear Float	Heat Stengthened
	Coatings	Surface #5: Low-e coating - Guardian SN 68		
Performance	U factor	0.12 (Centre of Glass), (U-0.24 Effective Curtainwall Assembly)		
	SHGC	0.29		
GL2	**Exterior - IGU - Triple Glazed - Impact-Resistant**			
Assembly	Exterior Lite	6mm	Clear Float	Heat Stengthened
	Coatings	Surface #1: Guradian Acid Etch Bird Protective Pattern		
	Coatings	Surface #2: :Low-e coating - Guradian SNX 70+		
	Air Space	12mm	Argon Filled	High performance warm edge spacer, black
	Middle Lite	6mm	Clear Float	Annealed
	Air Space	12mm	Argon Filled	High performance warm edge spacer, black
	Interior Lite 1	6mm	Clear Float	Heat Stengthened
	Coatings	Surface #5: Low-e coating - Guardian SN 68		
	Interior Lite 2	6mm	Laminated Safety Glass	Heat Stengthened
Performance	U factor	0.12 (centre of glass), (U-0.24 Effective Curtainwall Assembly)		
	SHGC	0.29		
GL3	**Exterior - IGU - Double Glazed Entrance Doors, Vestibule screens**			
Assembly	Exterior Lite	6mm	Clear Float	Heat Stengthened
	Surface 1 Coatings	None		
	Surgace 2 Coatings	Surface #2: :Low-e coating - Guradian SNX 70+		
	Air Space	12mm	Argon Filled	High performance warm edge spacer, black
	Interior Lite	6mm	Clear Glass	Heat Stengthened
	Coatings	applied contrasting decal film per City of Winnipeg Accessibility Standard 3M™ Crystal Glass Finishes, 7725SE-314, dusted crystal		
Performance	U factor	0.45 (Effective frame + glass)		
	SHGC	0.4		

Exterior Vision Glazing in Fibreglass Window Frames				
GL4	**Exterior - IGU - Triple Glazed - Fibreglass Windows**			
Assembly	Exterior Lite 1	3mm	Clear Glass	Heat Strengthened
	Coatings	Surface #2: Cardinal Ceramic Ink Bird Protective Pattern		
	Exterior Lite 2	3mm	Clear Glass (laminated)	Heat Strengthened
		Surface #4: Cardinal Low E-272		
	Air Space	12mm	Argon Filled	High performance warm edge spacer, black
	Middle Lite	6mm	Clear Glass	Annealed
	Air Space	12mm	Argon Filled	High performance warm edge spacer, black
	Interior Lite	6mm	Clear Glass	Heat Strengthened
	Coatings	Surface #7: Cardinal Low E-180		
Performance	U factor	U-0.17 minimum Overall Effective Fibreglass Window Assembly		
	SHGC	0.33 minimum		

Exterior Spandrel Glazing in Aluminum Curtainwall				
SP1	**Exterior - IGU Spandrel - Double Glazed**			
Assembly	Exterior Lite	6mm	Clear Float	Heat Stengthened
	Coatings	Surface #1: Guardian Acid Etch Bird Protective Pattern Surface #2 Guardian SNX 70+		
	Air Space	12mm	Argon Filled	High performance warm edge spacer, black
	Interior Lite	6mm	Clear Float	Heat Stengthened
	Coatings	Surface #3: no coating Surface #4: OPACI-coat finish to match colour selected by Contract Administrator		
	Galvanized Metal Liner Pan with 125mm Insulation, Back and 4 sides			
Performance	U factor	0.14 (minium for total assembly)		
	SHGC	N/A		

Interior Glazed Screens				
GL10	**Laminated Interior Screens - Impact Resistant Safety Glass, Engineered as Guard**			
Location	Level 2 Running Track, Multipurpose Living Room			
Frame Type	Screen Type 1: Storefront Aluminium Glazing System with Butt-jointed Glazing Sealant at Intermediate Verticals			
Assembly	Lite 1	8mm	Clear Glass	Tempered
	Interlayer	clear SGP interlayer		
	Lite 2	8mm	Clear Glass	Tempered
Coatings	Surface#4 applied colour contrasting decal film per City of Winnipeg Accessibility Standard 3M™ Crystal Glass Finishes, 7725SE-314, dusted crystal			
GL11	**Laminated Interior Screens - Impact Resistant Safety Glass**			
Location	Level 1 Gymnasium, Family Change Room			
Frame Type	Screen Type 1: Storefront Aluminium Glazing System with Butt-jointed Glazing Sealant at Intermediate Verticals Screen Type 2: Storefront Aluminium Glazing System			
Assembly	Lite 1	8mm	Clear Glass	Tempered
	Interlayer	clear PVB interlayer		
	Lite 2	8mm	Clear Glass	Tempered
Coatings	Surface#4 applied colour contrasting decal film per City of Winnipeg Accessibility Standard 3M™ Crystal Glass Finishes, 7725SE-314, dusted crystal			
GL12	**Glazed Partitions at Door Side Lites**			
Location	Typical Side Lites at Interior Doors - Excluding doors at Gymnasium & Running Track			
Frame Type	Hollow-metal door frames Screen Type 2: Storefront Aluminium Glazing System			
Assembly	Lite 1	12.5mm	Clear Glass	Tempered
Coatings	Surface#4 applied contrasting decal film per City of Winnipeg Accessibility Standard 3M™ Crystal Glass Finishes, 7725SE-314, dusted crystal			
GL13	**Glazed Partitions at Door Side Lites (Privacy)**			
Location	Typical Side Lites at Interior Doors - Excluding doors at Gymnasium & Running Track			
Frame Type	Hollow-metal door frames			
Assembly	Lite 1	12.5mm	Clear Glass	Tempered
Coatings	Surface#4 Full Coverage Privacy Film 3M™ Crystal Glass Finishes, 7725SE-314, dusted crystal			
GL14	**Fire Rated Glazing (45 minute FRR to match door)**			
Location	Interior Exit Doors			
Frame Type	Hollow-metal doors			
Assembly	Lite 1	Imapact Safety Rating per code requirements, non-wired		
GL15	**Laminated Interior Screens - Impact Resistant Safety Glass, Engineered as Guard, Privacy Film**			
Location	Movement Studio			
Frame Type	Screen Type 1: Screen Type 1: Storefront Aluminium Glazing System with Butt-jointed Glazing Sealant at Intermediate Verticals			
Assembly	Lite 1	8mm	Clear Glass	Tempered
	Interlayer	clear SGP interlayer		
	Lite 2	8mm	Clear Glass	Tempered
Coatings	Surface#4 Privacy Film to height shown on drawings 3M™ Crystal Glass Finishes, 7725SE-314, dusted crystal			

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Translucent privacy film; applied to interior glazing.

.2 Translucent colour contrasting film (glass decals); applied to interior glazing.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Samples:

.1 Submit 3 - 200 mm x 200 mm (8" x 8") samples of each specified film type, pattern and colour.

.4 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit maintenance and cleaning instructions for incorporation into operating and maintenance manuals.

.2 Submit reports recording demonstration and training provided to City.

1.4 Quality Assurance

.1 Qualifications:

.1 Subcontractor: Shall have 5 years' experience, minimum, in application of Materials specified.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 System:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

.2 Film manufacturer's product warranty.

.1 Duration: 6 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Applied film shall function as intended, and exhibit none of the following:

.1 Bubbling.

.2 Cracking.

.3 Crazing.

.4 Delamination.

.5 Discolouration.

.6 Peeling.

2.3 Materials

.1 Applied films; translucent privacy film (FLM1):

.1 Acceptable Materials:

.1 3M 'Crystal Glass Finishes, 7725SE-314, dusted crystal'.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Applied films; translucent colour contrasting film:

.1 Acceptable Materials:

.1 3M 'Crystal Glass Finishes', custom colour to later selection by Contract Administrator.

.2 Substitutions: in accordance with Section 01 25 00.

PART 3 - EXECUTION

3.1 Examination

.1 Examine glass surfaces to receive film and verify that they are free from defects and imperfections which will affect the final appearance of installed film. Correct such deficiencies before starting film application.

3.2 Preparation

.1 Prepare surfaces for film application in accordance with film manufacturer's written requirements.

.2 Window and window framing will be cleaned thoroughly with a neutral cleaning solution. Surface of glass shall be bladed with industrial razor to ensure the removal of any foreign contaminants in accordance with film manufacturer's instructions.

.3 Towelling or other absorbent material shall be placed on the window sill or sash to absorb moisture accumulation generated by the film application.

3.3 Installation

.1 Applied film; interior application:

.1 Apply film to indicated surface of glazing units in accordance with film manufacturer's written requirements, applied plumb, true and level over clean glazing, without air bubbles, wrinkles, blisters, and other defects.

.2 After installation, applied film shall be flat with no obvious concentrations of moisture, free of creases, free of tears, with no moisture dimples when viewed under normal conditions.

.3 Film edges shall be cut neatly and square at a uniform distance of 1.5 mm (1/16") to 0.79 mm (1/32") from frame.

3.4 Adjusting and Cleaning

.1 Clean film and glass surfaces so they are free of foreign matter using cleaners recommended by film manufacturer.

3.5 Demonstration

.1 Demonstration shall be in accordance with Section 01 79 00.

.2 Instruct City's representative on proper care and maintenance for work of this section.

3.6 Protection

.1 Comply with manufacturer's written requirements respecting protection.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Louvres.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section, including the following information:

.1 Air flow and water entrainment performance test results.

.2 Material types and thickness.

.3 Shop drawings:

.1 Submit engineered shop drawings.

.2 Include elevations, sections and specific details for each louvre.

.3 Show anchorage details and connections for component parts.

.4 Samples:

.1 Submit colour chips for approval. Submit duplicate samples of each type of louvre showing colour and finish.

.5 Test and evaluation reports:

.1 Air and water performance data: Submit AMCA test data as required to confirm that the louvres have the specified air and water performance characteristics when tested in accordance with AMCA 500-L-12.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Installers: Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 5 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Design louvres to withstand wind loads and snow loads as required by the building code, to maximum allowable deflection without permanent deformation. Maximum allowable deflection for the louvre structural members to be L/175 or 19 mm (3/4"), whichever is less. Maximum allowable deflection for the louvre blades to be L/120 or 13 mm (1/2") across the weak axis, whichever is less.

.2 Aluminum framing members shall be designed in accordance with CAN/CSA-S157-17/S157.1-17.

.3 Design structural steel structural components and fasteners in accordance with CSA-S16-19.

.4 Design fasteners in accordance with AAMA TIR Metal Curtain Wall Fasteners.

.5 Design louvres, including comprehensive engineering analysis using structural performance requirements and design criteria indicated.

.6 Louvres shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louvre components, noise or metal fatigue caused by louvre blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.

.1 Louvres to withstand wind pressures when subjected to positive and negative wind loads based on building code 50 year probability.

.7 Allow for thermal movements from ambient and surface temperature changes, without buckling, opening of joints, overstressing of components, failure of connections, or other detrimental effects.

.8 Provide louvres which have been tested (manufacturer's stock units identical to those provided, except for length and width) according to AMCA 500-L-12

2.3 Materials

.1 Bird screen and frames:

.1 Bird screen mesh: 13 mm (1/2") mesh, 1.27 mm (0.050") thick expanded and flattened aluminum screen secured within 1.40 mm (0.055") thick extruded aluminum frames with mitred corners and corner locks.

.2 Finish: Mill finish.

.2 Insulated blank-off panels:

.1 Thickness: 38 mm (1-1/2") thick minimum unless otherwise indicated.

.2 Facing: Face both sides with 0.81 mm (0.032") thick aluminum sheet.

.3 Insulation core: Insulation board made from inorganic glass fibres preformed into boards bonded by thermosetting resin.

.4 Panel perimeter frame: 1.27 mm (0.050") thick-formed aluminum channels, mitred at the corners.

.5 Panel finish: exterior face to match louvres.

.3 Aluminum extrusions: in accordance with ASTM B211/B211M-19, Alloy 6063-T5, 6063-T6 or 6061-T6.

.4 Aluminum sheet: in accordance with ASTM B209/B209M-21a, Alloy 1100, 3003 or 5005. For anodized finish if required use Alloy 5005.

.5 Fasteners and anchors: Stainless steel Type 304.

.6 Sealant: in accordance with Section 07 92 00.

.7 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

2.4 Wall Louvres

.1 LV1, LV2:

.1 Acceptable Materials:

.1 Price Industries Ltd. ‘DE439’.

.2 Subject to compliance with Contract Documents, acceptable equivalent Materials of following manufacturers may be used upon approval:

.1 Greenheck.

.2 Nailor.

.3 Ruskin.

.2 Description:

.1 Drainable louvres with 39°stationary blades.

.2 Depth: 102 mm (4").

.3 Heads, sills, jambs and mullions to be one piece structural aluminum members with integral caulking slot and retaining beads.

.4 Mullions shall be sliding interlock.

.5 Blades to be one piece aluminum extrusions with reinforcing bosses.

.6 Material thickness to be as follows:

.1 Heads, sills, jambs and mullions: 2.06 mm (0.081").

.2 Blades: 2.06 mm (0.081").

.7 Louvres to be supplied with 50 mm (2") high by full depth sill flashings formed from minimum 1.27 mm (0.050") thick aluminum, complete with sealed end dams to direct water to exterior.

.8 Louvres and sill flashings to be installed provide complete water integrity performance of the louvre system, and drain water infiltration from interior face of louvre/blank-off assembly to exterior.

.3 Performance: To AMCA 500-L-12.

.4 Accessories:

.1 Insulated blank-offs.

.2 Bird screen.

2.5 Finishes

.1 Exposed aluminum surfaces: 70% Kynar 500 or Hylar 5000 fluoropolymer resin systems, ceramic pigments and other select inorganic pigments to AAMA 2605-22.

.1 Acceptable Materials:

.1 PPG 'Duranar XL'.

.2 Sherwin-Williams ‘Fluropon Classic’.

.2 Colour: to later selection by Contract Administrator from manufacturer’s full range. Colour shall be solid.

.2 Finish exposed metal fasteners, if applicable, to related aluminum surfaces.

.3 Finish steel clips and reinforcing steel with 380 g/m^2 (13 oz/ft^2) zinc coating to CAN/CSA G164-18.

2.6 Fabrication

.1 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.2 Fabricate finish work free from distortion and effects detrimental to appearance and performance.

.3 Louvres indicated to wrap continuously around corners shall be mitred at corner intersection.

.4 Blank off panels to be full extent of louvres except where penetrated by mechanical services, unless indicated otherwise.

.5 Attach bird screen to non-exposed face of louvres.

PART 3 - EXECUTION

3.1 Preparation

.1 Verify dimensions of supporting structure at the site by accurate field measurements so that the work will be accurately designed, fabricated and fitted to the structure.

3.2 Installation

.1 Install louvers in accordance with manufacturer's written requirements.

.2 Apply sealant to joints and penetrations to maintain weather tight installation, while allowing drainage to exterior at sill flashing.

.3 Allow for thermal expansion and contraction.

.4 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.5 Cut and trim component parts during erection only with the approval of the manufacturer, and in accordance with its requirements. Restore finish completely. Remove and replace members where cutting and trimming has impaired the strength or appearance of the assembly.

.6 Do not erect warped, bowed, deformed or otherwise damaged or defaced members. Remove and replace any members damaged in the erection process as directed.

3.3 Installation Tolerances

.1 Maximum variation from plane or location shown on the reviewed shop drawings: 3 mm per 3660 mm (1/8" per 12 feet) of length, but not exceeding 13 mm (1/2") in any total building length or portion thereof (non-cumulative).

.2 Maximum offset from true alignment between two members abutting end to end, edge-to-edge in line or separated by less than 75 mm (3"): 1.5 mm (1/16") (shop or field joints). This limiting condition shall prevail under both load and no load conditions.

.3 Set units level, plumb and true to line, with uniform joints.

3.4 Adjusting and Cleaning

.1 Repair or replace damaged finishes or materials.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Metal support systems for interior gypsum board assemblies.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the Work of this section, including additional data as may be required to demonstrate compliance with the Contract Documents.

.3 Shop drawings; for shaftwalls:

.1 Submit written confirmation and design for shaftwall construction showing adequacy of system in meeting fire ratings and its ability to withstand pressures and deflections that may occur.

.4 Test and evaluation reports:

.1 Submit certified test results for each required fire resistance rated assembly for work of Section 09 22 00.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Quality Assurance

.1 Qualifications:

.1 Installers / applicators / erectors:

.1 Subcontractor: Shall have 5 years' experience, minimum, in application of Materials, systems, and assemblies specified.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements - Shaftwall System Description

.1 Gypsum board shaft systems include special purpose assemblies of gypsum boards and metal components designed for erection entirely from room side of shaft (except for application of finish layer on shaft side, where required to form an enclosure).

.2 Provide gypsum board shaft systems designed and tested by manufacturer to withstand lateral design loading (air pressure) of 48 kg/m^2 (10 lb/ft^2), applied transiently and cyclically, for maximum heights of partitions required, within deflection limit of 1/240 of partition height and in stairways.

.3 Provide gypsum board shaft systems designed and tested by manufacturer in accordance with ASTM E90-09 to achieve a minimum STC rating as indicated.

2.3 Performance/Design Requirements - Fire Resistance Rated Assemblies

.1 Where gypsum board systems with fire resistance ratings are indicated or required, provide materials and installations that are identical with those of applicable assemblies tested by fire testing laboratories acceptable to authorities having jurisdiction.

2.4 Materials - General

.1 Sheet metal thicknesses specified in Section 09 22 00 indicate the minimum base steel thickness excluding coating.

.2 Protective coatings for metal supports and framing:

.1 Minimum corrosion protection: Z120 (G40) ASTM A653/A653M-18.

.2 Heavy duty corrosion protection, where noted below or as indicated: Z275 (G90) ASTM A653/A653M-18:

.1 Within wall cavities with plumbing.

.2 Within rooms with toilets, showers, sinks or lavatories.

.3 Sheet metal screws: minimum coating thickness of 0.008 mm (0.0003") of zinc. Other coatings providing equal or better corrosion protection may be used, subject to acceptance of Contract Administrator.

.4 Screws:

.1 Steel screws: equal to or exceeding minimum diameter indicated on shop drawings.

.2 Penetration beyond joined materials shall be not less than 3 exposed threads.

.3 Thread types and drilling capability shall conform to manufacturer's recommendations.

.5 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

2.5 Partition Support Materials

.1 Interior non-loadbearing channel stud framing: in accordance with ASTM C645-18; roll formed from galvanized steel sheet, minimum thickness 0.455 mm (0.0179") unless otherwise specified, indicated, or recommended by gypsum board manufacturer.

.1 Steel studs; at backer plate locations: 0.836 mm (0.0329") minimum thickness.

.2 Steel studs at abuse resistant gypsum board locations: 0.836 mm (0.0329") minimum thickness.

.3 Steel studs at impact resistant gypsum board locations: 0.836 mm (0.0329") minimum thickness.

.4 Steel studs at tile backer board locations: 0.836 mm (0.0329") minimum locations.

.2 Interior floor and ceiling tracks (runners): in accordance with ASTM C645-18; in widths to suit stud sizes.

.1 Metal thickness: to match studs.

.2 For openings wider than 914 mm (36"), provide 0.836 mm (0.0329") minimum thickness for header.

.3 Deflection track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in metal thickness not less than indicated for studs and in width to accommodate depth of studs.

.4 Interior floor and ceiling track (runner) fasteners:

.1 To concrete and masonry: Use stub nails or power-driven fasteners.

.2 To suspended acoustic ceiling tile grid: Manufactured to fit applicable ceiling grid profile:

.1 Acceptable Materials:

.1 CGC 'Partition Clip'.

.2 Substitutions: in accordance with Section 01 25 00.

.5 Bracing channels: Minimum 19 mm x 10 mm x 1.087 mm (3/4" x 3/8" x 0.0428") cold rolled galvanized steel.

2.6 Ceiling Support Materials and Systems

.1 General: Size ceiling support components in accordance with ASTM C754-18 unless otherwise indicated.

.2 Main runners: Steel channels, hot or cold rolled; Z180 (G60) galvanized.

.3 Hanger wire:

.1 In accordance with ASTM A641/A641M-19, soft, Class 1 galvanized, minimum 4.064 mm (0.160", 8 AWG).

.4 Hanger rods and flats: Mild steel with zinc coating, galvanized for exterior applications.

.1 General: Size devices for 5 times load imposed by completed system as determined in accordance with ASTM E488/E488M-22.

.2 Screws, clips, bolts, concrete inserts or other devices for ceiling hangers whose suitability for use intended has been proven through standard construction practices or by certified test data.

.3 Fasteners exposed to weather, condensation, and corrosion: Zinc-plated or stainless steel fasteners in applicable product lines specified in preceding paragraphs.

.4 Hangers: in accordance with ASTM C754-18 for maximum ceiling area and loads to be supported.

.5 Interior concrete ceiling anchors:

.1 Acceptable Materials:

.1 ITW Ramset/Red Head ‘Dynabolt Sleeve Anchor TW-1614' or ‘Redi-Drive Tie Drive’ or ‘Redi-Drive’ with angle clip.

.2 ITW Ramset/Red Head ‘Trubolt’ or ‘Dynabolt’ anchors complete with galvanized angle clip.

.3 Hilti ‘Kwik-Bolt 3’ and ‘HHDCA 1/4 Ceiling Hangers’.

.4 Substitutions: in accordance with Section 01 25 00.

.5 Tie wire: 1.19 mm (0.047”, 18 AWG) minimum zinc coated, soft-annealed wire, in accordance with ASTM A641/A641M-19.

.6 Furring anchorages: 1.62 mm (0.0637”, 16 AWG) galvanized wire ties, manufacturer's standard wire type clips, bolts, nails or screws as recommended by furring manufacturer and in accordance with ASTM C754-18.

.7 Runner (carry) channels: 1.367 mm (0.0538”) thick cold rolled steel, in accordance with ASTM C754-18, with minimum 228 MPa yield strength:

.1 38 mm x 12.7 mm (1-1/2" x 1/2") where supported at centres of 914 mm (36") maximum.

.2 38 mm x 19 mm (1-1/2" x 3/4") where supported at centres of 1220 mm (48") maximum.

.3 Finish: primer painted or zinc coated.

2.7 Furring

.1 Furring channels: 0.455 mm (0.0179”) minimum typical thickness, cold rolled steel, wiped coated, nominal size of 22 mm (7/8") depth x 35 mm (1-3/8") face, hat type with knurled face.

.2 Resilient furring channels:

.1 Acceptable Materials:

.1 Bailey Metal ‘Resilient Channel’.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Z-furring members: Galvanized steel z-shaped furring members; in accordance with ASTM A653/A653M-18, G60, 0.836 mm (0.0329”) minimum thickness of base metal, of depth indicated, designed for mechanical attachment of insulation boards or blankets.

.4 Fasteners for furring members: Type and size recommended by furring manufacturer for substrate and application indicated, load rating, and spacing to support materials carried by assembly with factor of safety of 3x per fastener manufacturer data sheets.

2.8 Shaftwall

.1 Shaftwall studs and accessories: 0.455 mm (0.0179”), 0.836 mm (0.0329”) where plywood attachment is required, rolled galvanized steel sheet fabricated specially for gypsum coreboard and facing boards.

.2 Provide manufacturer's standard shapes for shaftwall construction; of profile, size and base metal thickness designed in accordance with AISI "Specification for Design of Cold Formed Steel Structural Members" for structural performance characteristics indicated. Fabricate from steel sheet in accordance with ASTM A653/A653M-18, Grade A or B, for structural performance of base metal, as well as with ASTM A653/A653M-18, G60, for hot dip galvanized Materials, and ASTM A463/A463M-22 for aluminized Materials.

2.9 Accessories

.1 Backer plates:

.1 Metal backer plates: Steel, galvanized; fastened to studs for attachment of surface mounted fittings and accessories minimum 150 mm (6") wide x length and width to suit size of items to be attached; x minimum base metal thickness as follows:

.1 0.836 mm (0.0329”).

.2 Plywood backer plates: Softwood plywood in accordance with Section 06 40 00; 19 mm (3/4") minimum x length and width to suit size of items to be attached; fastened to studs for attachment of surface mounted fittings and accessories. Provide fire retardant pressure treated plywood at rated partitions.

.3 Dimensional wood blocking: in accordance with Section 06 10 00.

.4 Elimination of backer plates or direct attachment of accessories or equipment to studs shall not be permitted.

PART 3 - EXECUTION

3.1 Installation General

.1 Install in accordance with ASTM C754-18 and manufacturer's written requirements, except as modified by Section 09 22 00. Do not bridge building expansion joints with support system. Frame both sides of joints with furring and other supports as indicated.

.2 Install studs, framing, shimming, and furring to provide proper support for gypsum board to achieve the following installation tolerances:

.1 Do not exceed 3 mm (1/8") in 3 m (10’) variation from plumb, level, and plane.

.2 Do not exceed 10 mm (3/8”) from drawings locations.

.3 Do not exceed 1.5 mm (1/16”) variation between planes of abutting edges or ends.

.4 Install each framing member so fastening surfaces vary not more than 3.2 mm (1/8") from the plane formed by faces of adjacent framing.

.5 In double stud walls, do not bridge across studs on opposite sides of wall with gypsum board or metal cross bracing.

.3 Cooperate with and give direction to trades erecting framing and furring over which the work of Section 09 22 00 is applied. Coordinate finished joint location with framing.

.4 Coordinate installation and cooperate with mechanical and electrical work to accommodate mechanical electrical items and any other work required to be incorporated into or coordinated with the partitions, ceiling and soffit systems.

.1 Where the presence of suspended ductwork or other mechanical or electrical services or devices above ceiling framing conflicts with ceiling framing suspension points from structure above, provide bridging framing below conflicting work as required to support ceiling framing on specified intervals.

.2 Do not suspend ceiling framing from mechanical or electrical suspension systems unless agreement is obtained in writing from engineer for Subcontractor installing such framing that additional imposed loads are acceptable; obtain Contract Administrator’s acceptance before proceeding.

.5 Provide clearances between work of Section 09 22 00 and structural elements to prevent transference of structural loads.

.6 Do not bridge building expansion joints with steel framing or furring members. Independently frame both sides of joints with framing of furring members or as indicated.

.7 Size framing systems in accordance with manufacturer’s engineered load tables, to meet allowable deflection without permanent deformation.

.1 Maximum allowable deflection: L/240.

.2 Maximum allowable deflection for tiled partitions: L/360.

.8 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

3.2 Blocking

.1 Attach to framing backer plates to support the load of, and to withstand the withdrawal and shear forces imposed by, items installed upon the work of Section 09 22 00.

3.3 Furring - General

.1 Furring indicated in Contract Documents is schematic. Do not regard as exact or complete. Provide all necessary framing and furring to support gypsum board in accordance with manufacturers' specifications.

.2 Shim furring as required to achieve required installation tolerances.

.3 Leave finished work rigid, secure, square, level, plumb, and erected to maintain finish gypsum board line dimensions and contours. Make allowance for thermal movement.

.4 Thermally separate metal studs from exterior concrete or masonry.

3.4 Suspended and Furred Ceilings

.1 Arrange hangers for suspended gypsum board ceilings to provide support independent of walls, columns, pipes, ducts; erect plumb, and securely anchored to structural frame, or embed in concrete slabs.

.2 Keep lateral braces at hangers back 450 mm (18") minimum unless otherwise noted.

.3 Space hangers along runner channels in accordance with ASTM C754-18, and not more than 150 mm (6") from ends.

.4 Space runner channels at 1220 mm (48") on centre, maximum, and not more than 150 mm (6") from boundary walls, interruptions of continuity, and changes in direction. Run channels transversely to structural framing members.

.5 Where splices are necessary, lap members at least 200 mm (8") and wire each end with 2 loops. Avoid clustering or lining up of splices.

.6 Attach to rod hangers by bending hanger sharply under bottom flange of runner, and securely wiring in place with saddle tie.

.7 Erect cross furring channels transversely across runner channels at 400 mm (16") on centre maximum, 305 mm (12") on centre at fire rated assemblies, at not more than 150 mm (6") from boundary wall openings, interruptions in ceiling continuity, and changes in direction.

.8 Secure furring channels to each support with purpose-made slips or wire tie. Splice joints by lapping channels and tying together.

.9 Level cross furring channels to maximum tolerance of 3 mm in 3 m (1/8” in 10 ft).

.10 Install ceiling framing assemblies at interface with suspended acoustical ceilings specified in Section 09 51 23, to project minimum of 100 mm (4") above acoustic tile suspension assemblies.

3.5 Wall Furring

.1 Install steel furring for braced walls, free standing walls, walls that are furred out as indicated.

.2 Frame openings and around built-in equipment, cabinets, access panels, on 4 sides, with channels. Extend furring into reveals. Check clearances with equipment suppliers.

.3 Provide bulkheads and boxed-in duct shafts, for beams, columns, pipes and around exposed services where indicated. Install 19 mm (3/4") channels at corners and at 305 mm (12") on centre.

3.6 Resilient Furring

.1 Ceilings:

.1 Fasten the resilient furring at right angles to ceiling framing members every 305 mm (12").

.2 Fasten the first furring member 150 mm (6") from the wall.

.3 Fasten the second furring member 305 mm (12") from the same wall.

.4 Fasten the last furring member 150 mm (6") from the opposite wall.

.2 Partitions:

.1 Install resilient furring with outer leg oriented upward.

.2 Resilient furring channels shall be spaced not more than 610 mm (24") on centre and shall be fastened at right angles to wall framing members.

.3 Fasten the first furring member 50 mm (2") from the floor.

.4 Fasten the last furring member 150 mm (6") from the ceiling.

.3 Secure to each support with 25 mm (1") gypsum wallboard screw.

3.7 Metal Stud Partition Framing

.1 Provide partition tracks (runners) at floor and underside of structural assembly and as follows:

.1 Align accurately and lay out according to partition layout.

.2 Secure runners to concrete, access flooring and to concrete slabs, as applicable, with screwed or shot fasteners located 50 mm (2") from each end and spaced at maximum 610 mm (24") on centre.

.3 At partition corners, extend one runner to end of corner and butt other runner to it, allowing necessary clearance for gypsum board thickness. Runners should not be mitred.

.2 Unless otherwise indicated, place interior studs vertically at centres as follows:

.1 Provide studs at 400 mm (16") on centre, and as specially spaced in accordance with details indicated.

.2 Provide studs not more than 50 mm (2") from abutting walls, openings and each side of corners.

.3 Provide freedom for 19 mm (3/4") deflection under beams, structural slabs and the like to avoid transmission of structural loads to studs, or install 50 mm (2") leg ceiling tracks.

.3 Install studs in tracks at floor and ceiling.

.4 Where horizontal runs of service lines are scheduled to be installed, arrange with applicable trades and install studs simultaneously with services.

.5 At openings in stud walls, erect track at head and sills to accommodate intermediate studs. At each end of track, cut out flanges, turn up web, and fasten to studs. Install intermediate studs above and below openings in same manner and spacing as wall studs. Install double studs at each jamb, and double tracks at head of door openings.

.6 At partitions requiring fire rating, erect in accordance with requirements of listing.

.7 Size studs, connections, and runners to carry loads according to stud manufacturer's load tables, at 24 kg/m^2 (5 lb/ft^2) live load to meet maximum allowable deflection limits. Where depth of stud is indicated, size metal thickness to meet allowable deflection limits.

.8 Provide three studs at corner and intermediate intersections of partitions.

.9 Coordinate work with others installing horizontal runs of service lines so that work is done simultaneously. Where standard holes are too small for installed services, notch studs, and splice notched flanges with splice pieces 305 mm (12") longer than notches, each fastened with 2 screws.

.10 Coordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.11 Coordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other sections.

.12 Unless otherwise indicated, partitions, together with gypsum board facings, shall extend above ceilings to underside of structure above.

.13 Chase walls:

.1 Provide chase walls consisting of two parallel steel stud partitions.

.2 Provide cross bracing consisting of metal furring, located at quarter points on each pair of studs. Attach cross bracing to studs with metal screws.

.14 Lateral support bracing channels:

.1 Stiffen partitions over 3 m (10’) in vertical span, at mid-height to maximum vertical spacing of 2440 mm (8’) on centre, with at least one 19 mm (3/4") horizontal bracing channel, extending full length of partition, overlapping at least two stud spaces at ends of bracing channels.

.2 Stiffen partitions at not more than 150 mm (6") from the top and bottom of openings and across two full stud spaces at each side of openings with horizontal bracing channel.

.15 Curved partitions framing erection:

.1 Cut top and bottom runner through leg and web at 51 mm (2") intervals for arc length. Allow 300 mm (12") uncut straight runner at each end of arc. Bend runners to uniform curve of specified radius. Clinch a 25 mm (1") x 25 gauge steel strip to inside of cut leg using metal lock fastener. Attach steel runners at floor and ceiling to structural elements with suitable fasteners located 51 mm (2") from each end and spaced 600 mm (24") on centre. To suspended ceilings, use toggle bolts or hollow wall anchors spaced 400 mm (16") on centre.

.2 Position studs vertically, with open side facing in same direction and engaging floor and ceiling runners. Begin and end each arc with a stud and space intermediate studs equally along outside of arc. Secure studs to runners with 10 mm (3/8") pan head framing screws. On tangents, place studs 150 mm (6") on centre leaving last stud freestanding. Install balance of stud system in normal manner according to specifications.

3.8 Control Joints

.1 Control joints: in accordance with Section 09 29 00.

3.9 Concrete Anchors

.1 Provide anchors and anchorage points in reinforced concrete floor slab underside in accordance with gypsum board manufacturer’s suspension requirements. Drill holes with carbide-tipped drill bits in accordance with ANSI B212.15-1994 (R2000).

.2 Provide anchors; minimum installation depth, and method of expansion as recommended by the anchor manufacturer.

3.10 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.1 Field tests and inspections:

.1 Independent inspection and testing company shall perform random load tests for ceiling anchor installation.

.2 Fixings shall be tested to a load of 1.5 times the applied working load. The pass criterion shall be that no significant movement of the fixing is apparent. A visual check shall be sufficient.

.3 For test loads up to 0.25 kN (light weight ceilings less than 10kg/m^2) tests may be done by the use of a simple spring balance.

.4 For test loads over 0.25 kN, tests shall be done using a test meter.

.5 Test a minimum of 5% of installed anchors but no fewer than 2, chosen at random and spread evenly.

.6 The failure of a fixing in proof testing shall require investigation and an increase in testing rate.

.1 For one failure: double the test rate to 1 in 10 and a minimum of 6.

.2 For more than one failure: test 100% of the job, review the fixing specification and installation method.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Gypsum board; wall and ceiling applications.

.2 Tile backer board.

.3 Gypsum board accessories and miscellaneous related materials.

.2 Section excludes:

.1 Gypsum sheathing board at roof assemblies: in accordance with Section 07 52 16.

.2 Gypsum sheathing board at wall assemblies: in accordance with Section 09 29 90.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Indicate aluminum acoustic closure for partition interface with aluminum mullions.

.4 Fire-rated assembly listings and STC assembly ratings:

.1 Submit fire-rated assembly listings for each required fire resistance rated assembly for work of this section.

.2 Submit STC assembly ratings for each required STC rated assembly for work of this section.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Quality Assurance

.1 Qualifications:

.1 Subcontractor: Shall have 10 years' experience, minimum, in successful installation of work of type and quality indicated and specified.

.2 Mock-ups:

.1 Construct mock-up of gypsum board wall and aluminum mullion interface finished in all respects. Size and location as directed by Contract Administrator, complete with examples of special trim accessories.

1.4 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of Section 09 29 00.

.2 Handle gypsum panel products and accessories in accordance with GA 216-24 and GA 801-23.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Single source responsibility:

.1 Provide gypsum board Materials from one manufacturer for the work of this section.

.2 Fire resistance rating:

.1 Construct fire resistance rated assemblies in accordance with listing and CAN/ULC S101-14.

.3 Paper-faced gypsum board: in accordance with ASTM C1396/C1396M-17.

.4 Glass scrim gypsum board: in accordance with ASTM C1658/C1658M-18.

.5 Fire rated in accordance with listed assemblies where indicated: Type X or Type C.

2.3 Gypsum Board Panels

.1 Gypsum board; paper faced:

.1 Acceptable Materials:

.1 CertainTeed 'Easi-Lite'.

.2 CGC 'Sheetrock Brand Ultralight Panel'.

.3 Georgia-Pacific 'ToughRock Lite-Weight Gypsum Board'.

.2 Locations: all walls and ceilings, unless noted otherwise.

.2 Gypsum board; non-rated and fire-rated, paper faced:

.1 Acceptable Materials:

.1 CertainTeed ‘Type X Drywall’ and ‘Type C Drywall’.

.2 CGC ‘SHEETROCK Brand Firecode X and Firecode C’.

.3 Georgia-Pacific ‘ToughRock Fireguard X Gypsum Board and ToughRock Fireguard C Gypsum Board’.

.4 PABCO Gypsum ‘Flame Curb Type X’.

.2 Locations: all fire-rated walls and partitions, and as shown on the Drawings.

.3 Gypsum board; interior mould and moisture resistant, glass scrim:

.1 Resistant to mould growth with highest level of performance (score of 10) when tested to ASTM D3273-21.

.2 Acceptable Materials:

.1 CGC ‘Sheetrock Brand Glass-Mat Panels Mold Tough Regular/Firecode X’.

.2 Georgia-Pacific ‘DensArmor Plus Fireguard’.

.3 Substitutions: in accordance with Section 01 25 00.

.3 Locations: all exposed areas within walls and rooms with plumbing piping and/or fixtures.

.4 Gypsum board; abuse resistant:

.1 Mould and moisture resistant: in accordance with ASTM D3273-21, with a panel score of 10.

.2 Abuse resistance performance in accordance with ASTM C1629/C1629M-23:

.1 Surface abrasion surface damage: Level 3.

.2 Surface indentation surface damage: Level 1.

.3 Soft-body impact penetration: Level 2.

.4 Hard body Impact resistance: Level 1.

.3 Paper faced:

.1 Acceptable Materials:

.1 CertainTeed ‘Extreme Abuse Drywall with M2Tech’.

.2 CGC ‘Sheetrock Brand Panels Mold Tough AR Firecode X’.

.4 Locations: all areas where exposed within 2440 mm of floor surface.

.5 Gypsum board; impact resistant:

.1 Mould and moisture resistant: in accordance with ASTM D3273-21, with a panel score of 10.

.2 Paper-faced:

.1 Impact resistance performance in accordance with ASTM C1629/C1629M-23:

.1 Surface abrasion surface damage: Level 3.

.2 Surface indentation surface damage: Level 1.

.3 Soft-body impact penetration: Level 3.

.4 Hard body Impact resistance: Level 3.

.2 Acceptable Materials:

.1 CertainTeed ‘Extreme Impact Resistant Gypsum Board with M2Tech’.

.2 CGC ‘Sheetrock Brand Panels Mold Tough VHI Firecode X’.

.3 Substitutions: in accordance with Section 01 25 00.

.3 Locations: as shown on Drawings, including all exposed areas in Gymnasium below Level 2, Fitness Centre and Movement Studio.

.6 Gypsum board; shaftwall assemblies, glass mat faced:

.1 Mould and moisture resistant: in accordance with ASTM D3273-16, with a panel score of 10.

.2 Acceptable Materials:

.1 CertainTeed ‘GlasRoc Shaftliner’.

.2 CGC ‘SHEETROCK Glass-Mat Liner Panels’.

.3 Georgia-Pacific ‘DensGlass Shaftliner’.

.3 Locations: as shown on the Drawings.

.7 Gypsum board; tile backer, glass mat faced:

.1 In accordance with ASTM C1178/C1178M-18.

.2 Acceptable Materials:

.1 CertainTeed ‘GlasRoc Tile Backer’.

.2 CGC ‘Durock Brand Glass-Mat Tile Backerboard’.

.3 Georgia-Pacific ‘DensShield Tile Backer’.

.3 Locations: all wall locations where tile finish is shown.

.8 Gypsum board; flexible for special curved applications, paper faced:

.1 Gypsum core panel with enhanced core to allow for flexibility.

.2 Thickness: 6.4 mm (1/4").

.3 For multiple layer application to achieve 12.7 mm (1/2") thick minimum overall thickness, flexible style for tight bending radii.

.4 Acceptable Materials:

.1 CertainTeed ‘1/4” Flex Drywall’.

.2 CGC ‘SHEETROCK 1/4” Flexible Gypsum Panels’.

.3 Substitutions: in accordance with Section 01 25 00.

.5 Locations: all curved wall locations as shown on Drawings.

2.4 Attachment Materials

.1 Screws; for gypsum board: bugle head, fine thread, self-tapping, Type G, Type W, Type S, or Type S-12 to suit framing type and metal gauge in accordance with GA 216-24, with corrosion resistant finish, and in accordance with ASTM C1002-07/ASTM C954-18.

.1 Screw sizing:

.1 #6 x 25 mm (1") for single thickness board fastening.

.2 #6 x 32 mm (1-1/4") for single thickness 15.9 mm (5/8") board fastening.

.3 #7 x 41 mm (1 5/8") for double thickness board fastening.

.4 25.4 mm (1”), 41 mm (1-5/8”), and 51 mm (2") for triple thickness board fastening, at stud locations, and 38 mm (1-1/2”) Type G screws for attaching face sheet to base sheets, in accordance with board manufacturer’s written requirements.

.2 Laminating adhesive; for gypsum panels: in accordance with gypsum board manufacturer's written installation requirements, to suit application.

.1 Use adhesives that have a VOC content of 50 g/L (1.8 oz/gal) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 Accessories

.1 Accessories: in accordance with ASTM C1047-19 unless otherwise indicated, maximum length pieces per location. Flanges shall be free from dirt, grease, or other material that adversely affects the bond of joint treatment or decoration.

.2 Trims; one of the following:

.1 Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.

.1 Shapes, including:

.1 Corner bead.

.1 Mechanically fastened corner beads at impact resistant gypsum walls.

.2 Casing trim.

.3 Reveal trims.

.4 Control joints, certified by manufacturer for use at fire resistance rated assemblies as required.

.2 Aluminum: extruded accessories of profiles and dimensions as indicated or required.

.1 Alloy and temper with not less than the strength and durability properties in accordance with ASTM B221 (ASTM B221M), Alloy 6063-T5.

.2 Shapes:

.1 Z reveal.

.2 Reveals and moldings at round columns.

.3 Acceptable manufacturers:

.1 Fry Reglet.

.2 Gordon Interior Specialties.

.4 Suspended gypsum board ceiling trim:

.1 Acceptable Material:

.1 Certainteed ‘Terminus Drywall Perimeter Trim’.

.2 Profile height: to later selection by Contract Administrator.

.3 Aluminum acoustic closure for partition interface with aluminum mullions:

.1 Description: Provide sound barrier mullion trim caps of design, basic profile, materials, and operation indicated. Provide units with capability to accommodate variations in adjacent surfaces and thermal movements. Furnish units in lengths of sufficient additional length to allow for field trimming to required length to match variations in construction tolerances of adjacent systems.

.2 Sound transmission performance: to meet or exceed STC rating of wall.

.3 Acceptable Materials:

.1 Gordon Inc. ‘Mullion Mate’.

.2 MULL-it-OVER Products; Sound barrier mullion trim cap systems.

.3 Substitutions: in accordance with Section 01 25 00.

.4 Finish: Custom; PPG ‘Duracron’ to match glazing mullion colour.

2.6 Related Support Assemblies and Backer Plates

.1 Metal support systems and backer plates at interior assemblies: in accordance with Section 09 22 00.

2.7 Joint Treatment Materials

.1 General: in accordance with ASTM C475/C475M-17(2022).

.2 Joint tape: in accordance with manufacturer’s written requirements.

.3 Joint compound for interior gypsum board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

.1 Prefilling: Use setting-type compound as recommended by panel board manufacturer.

.2 Embedding and first coat: Use setting-type or taping compound as recommended by panel board and trim accessory manufacturers.

.3 Fill and finish coats: Use sanding type setting-type or taping compound as recommended by panel board manufacturer.

.4 Joint compound for tile backer board: in accordance with manufacturer’s written requirements.

2.8 Acoustic Wall Assembly Materials

.1 All acoustic sealants to be minimum Class 25 in accordance with ASTM C920-18.

.2 Acoustic sealant; concealed locations: to meet material requirements as listed in Part 9 of ASTM C919-22, including ASTM C834-17 or ASTM C920-18:

.1 Acceptable Materials:

.1 Hilti Canada Corp ‘CS-S SA Light’.

.2 Pecora ‘BA-98’.

.3 Substitutions: in accordance with Section 01 25 00.

.3 Acoustic sealant; exposed locations, acrylic:

.1 Acrylic/latex acoustic sealant, Type S, Grade NS in accordance with ASTM C920-18, maximum VOC content 60 g/L, non-hardening or ASTM C834-17, Type OP, Grade -18° C.

.2 For exposed sealants use paintable sealant products, do use non-skinning type products where they are exposed to view or where sealant products may deteriorate (stain or bleed into) into painted surfaces.

.3 Acceptable Materials:

.1 Hilti Canada Corp ‘CS-S SA Light’.

.2 Pecora ‘BA-98’.

.3 Substitutions: in accordance with Section 01 25 00.

.4 Smoke and acoustic sealant; concealed and exposed locations, non-fire-rated acoustic assemblies:

.1 Acrylic smoke and acoustic sealant, in accordance with ASTM C834-17 maximum VOC content 60 g/L, paintable, Flame Spread Value of maximum 25 in accordance with CAN/ULC-S102-10.

.2 Sealant shall not deteriorate (stain or bleed into) painted surfaces.

.3 Acceptable Materials:

.1 Hilti Canada Corp ‘CS-S SA Light’.

.2 Tremco ‘Tremstop Smoke & Sound Sealant’.

.3 Substitutions: in accordance with Section 01 25 00.

.5 Acoustic sealant for plenum locations: Smoke-seal sealant with flame-spread not more than 25 and smoke developed classification not more than 50 in accordance with CAN/ULC-S102-10, in accordance with Section 07 84 00.

.6 Acoustic compound: premixed perlite plaster.

.7 Acoustic (sound attenuation) insulation:

.1 Mineral-fibre formaldehyde-free sound attenuation batts: in accordance with CAN/ULC S702-14, Type 1, non-combustible in accordance with CAN/ULC-S114-18, formaldehyde-free.

.1 Acceptable Materials:

.1 CertainTeed ‘Lanaé NoiseReducer’.

.2 Johns Manville ‘Sound-SHIELD’.

.3 Owens-Corning 'QuietZone'.

.4 Rockwool 'AFB evo'.

.5 Substitutions: in accordance with Section 01 25 00.

.2 Provide insulation with black finished face where indicated.

.3 Fasteners: use mechanical fasteners where required to secure insulation into position in accordance with insulation manufacturer.

2.9 Access Doors

.1 Architectural access panels: in accordance with Section 08 31 13.

.2 Access doors: in accordance with Divisions 21, 22, and 23 and Divisions 26, 27, and 28.

PART 3 - EXECUTION

3.1 Board Installation - General

.1 Before installation of board commences, verify that internal services have been installed, tested, and approved; conduits, pipes, cables, and outlets are plugged, capped, or covered; and that fastenings and supports are in place.

.2 Remove debris and rubbish from wall and ceiling cavities before enclosing with board.

.3 General:

.1 Installation shall be in accordance with ASTM C840-18b, GA 216-24, GA 214-21, GA 600-24, and manufacturer's written requirements, except as otherwise indicated.

.4 Install exposed gypsum board with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for a light contact at edges and ends with not more than 1.6 mm (1/16") open space between boards. Do not force into place.

.5 Cover both faces of stud partition framing with gypsum board in concealed spaces (above ceiling, and the like) unless otherwise indicated, except in chase walls which are properly braced internally.

.6 Attach gypsum board to supplementary framing and blocking provided for additional support at openings and cut-outs.

.7 Apply components of fire-rated assemblies in conformance with indicated designs.

.8 Do not apply gypsum board in close proximity to hot pipes or heating ducts.

.9 Apply board with long dimension perpendicular to supports, unless otherwise indicated.

.10 Locate joints on opposite sides of partitions on different studs, and at least 305 mm (12") from opening jambs.

.11 Install materials with the minimum number of joints. Tightly butt joints, without force, and neatly align them.

.12 Form smooth joints at ends and at field cut edges of board panels.

.13 Frame openings on every side. Provide clearances with services.

.14 Work shall include bulkheads over doors, frames, screens, and changes in ceiling levels, pipe space and as indicated.

.15 Provide clearances between work of this section and structural elements to prevent transference of structural loads in accordance with Section 09 22 00.

.16 Fasten board to metal support members by metal gypsum board screws, 9.5 mm (0.374") minimum to, and 12.7 mm (1/2") maximum from, centre of joints.

.1 Space screws:

.1 At fire rated board as per fire-rated assembly.

.2 At typical board walls at 400 mm (16") on centre at edges and field unless otherwise required.

.3 At typical board ceilings at 305 mm (12") on centre at edges and field unless otherwise required.

.17 No joint will occur within 305 mm (12") of the corner of an opening.

.18 Locate gypsum panel product joints so that no joint will align with the edge of an opening unless control joints are to be installed at these locations.

.19 Tolerances:

.1 Do not exceed 3 mm (1/8") in 3 m (10’) variation from plumb, level, and plane in exposed surfaces, except at end joint between gypsum board panels.

.2 Do not exceed 10 mm (3/8”) from indicated location.

.3 Do not exceed 1.5 mm (1/16”) variation between planes of abutting edges or ends.

.4 Surface flatness shall not exceed 1.5 mm (1/16") within 305 mm (12") straight edge. For non-tapered-edge end joints between boards, measure flatness tolerance with end of straight end at centreline of joint.

3.2 Fire Separations

.1 Install fire-rated assemblies in accordance with assembly listing requirements in order to obtain fire ratings indicated and as required by authorities having jurisdiction.

.2 Vertical bulkheads in ceiling spaces over fire rated partitions, doors and the like shall have same fire rating as the partition over which they occur. Such bulkheads shall be of gypsum board construction unless otherwise indicated.

.3 Use fire rated gypsum wallboard as specified.

.4 Where lighting fixtures, diffusers, and the like are recessed into fire rated ceilings or bulkheads, provide enclosure to maintain required fire rating. Form removable panel to give access to fixture outlet box.

.5 Where fire hose cabinets or other fixtures or equipment are recessed in fire rated walls or partitions, provide gypsum board enclosure or backing to maintain required fire rating, unless otherwise detailed.

3.3 Curved Partition Installation

.1 Install curved partitions in accordance with GA 226-2019 in addition to standards specified in Section 09 29 00 for general board installation.

.2 Gypsum panel preparation:

.1 Select length and cut panel so one unbroken panel covers curved surface and 300 mm (12") tangents at each end. Outside panel must be longer than inside panel to compensate for additional radius contributed by studs.

.2 When wet panels are required, evenly spray water per manufacturer's written requirements on the surface to be in tension when panels are hung. Panels, while wet, should be bent to desired radius. Panels should be allowed to set in this shape prior to installation.

.3 Gypsum panel erection:

.1 Apply gypsum panels horizontally with the wrapped edges perpendicular to studs.

.1 To form convex surfaces, begin installation at one end of the curved surface and fasten panel to studs as it is wrapped around the curve.

.2 To form concave surfaces, start fastening panel to the stud at the centre of the curve and work outward to the panel ends.

.4 Fastener locations and spacing in accordance with reviewed shop drawings.

3.4 Interior Mould and Moisture Resistant Gypsum Board Installation

.1 Apply water resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish.

3.5 Abuse Resistant Board Installation

.1 Install abuse resistance gypsum board in accordance with gypsum board manufacturer's written requirements.

.2 Where both abuse resistant gypsum panels and plain gypsum board are used together on the same surface plane adjacent to one another, a smooth transition between the two types of boards is required. Finish the work in a manner such that the transition provides an inconspicuous joint when viewed by a person at normal viewing angles while standing in front of the boards from a distance of not less than 1000 mm (39").

3.6 Impact Resistant Board Installation

.1 Install impact resistance gypsum board in accordance with gypsum board manufacturer's written requirements.

.2 Where both impact resistant gypsum panels and plain gypsum board are used together on the same surface plane adjacent to one another, a smooth transition between the two types of boards is required. Finish the work in a manner such that the transition provides an inconspicuous joint when viewed by a person at normal viewing angles while standing in front of the boards from a distance of not less than 1000 mm (39”).

3.7 Interior Tile Backer Board Installation

.1 Install in accordance with manufacturer’s written requirements.

.2 Section 09 31 00 to install tile setting material over tape installed by this section. Install mesh tape centred over tile backer board joints.

3.8 Acoustic Wall Assemblies

.1 Acoustical sealant and plaster:

.1 Apply acoustical sealant to seal gaps in accordance with ASTM C919-22 and in accordance with the STC rated assembly.

.2 Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Locate edge trim and close off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings, in accordance with ASTM C919-22 and manufacturer's written requirements.

.3 Clean substrate, remove debris and deleterious substances.

.4 Apply sealant to close voids; no leaks around track and gypsum board.

.2 Sound attenuation insulation:

.1 Install sound attenuation insulation to fill cavity unless otherwise indicated.

.2 Trim insulation to provide close-fit contact to framing assemblies and fill the partition cavity or acoustic insulation assemblies to thicknesses specified or indicated.

.3 Maintain air space between backs of sound attenuation insulation and back of opposite partition face layer, as applicable.

.4 Cut insulation to provide close-fit contact around electrical boxes, pipes, and other obstructions and penetrations through and within acoustic assemblies.

.5 Extend acoustic partition assemblies to underside of structure. Incorporate approved provision to prevent transmittance of structural deflection to partition assembly.

.6 Staple sound attenuation insulation where required by manufacturer's installation requirements.

.7 Where studs are not faced with gypsum board on both sides, mechanically fasten wire mesh to non-faced side of stud to retain insulation.

.8 Mechanically attach sound attenuation insulation in wall assemblies where cavity of wall assembly is greater than 150 mm (6").

.9 Secure insulation in such a manner that it will not sag or settle away from required locations.

.3 Sound flanking paths:

.1 Where sound rated partition walls intersect non rated gypsum board partition walls, extend sound rated construction to completely close sound flanking paths through non rated construction in accordance with ASTM C919-22 and with manufacturer's written requirements.

.2 Seal joints between face layers at vertical interior angles of intersecting partitions.

3.9 Light Troughs and Ceiling Coves

.1 Construct light troughs and ceiling coves as indicated to profiles as shown, and prepare to receive lighting fixtures supplied and installed by Electrical drawings and specifications where required.

3.10 Accessories

.1 At external corners install corner trim secured to framing at 230 mm (9-1/16") on centre on both flanges with screw fasteners or clinch tool.

.2 Secure casing trim at board edges where exposed to view, where board butts against other materials with no trim to conceal junction, at perimeter of ceiling surfaces at tops of partitions where they stop against continuous ceiling surfaces, and where indicated.

.3 Erect accessories straight, plumb or level, rigid and at proper plane.

.4 Use full length pieces.

.5 Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners, free from rough edges. Secure in accordance with manufacturer's specifications unless otherwise required.

.6 Installation tolerances:

.1 Alignment with board panels shall not exceed tolerances specified above.

.2 End joints shall be flush aligned to maximum offset of 0.5 mm (0.020”).

3.11 Access Doors

.1 Install access doors as supplied by Divisions 21, 22, and 23 and Divisions 26, 27, and 28.

.2 Coordinate with the work of Section 08 31 13 for installation of architectural access panels.

.3 Install access panels in locations to be determined by coordination with trades installing mechanical, electrical and other building services. Locations to be reviewed and confirmed by Contract Administrator.

.4 Rigidly secure frames to furring or framing systems.

3.12 Finishing

.1 Provide levels of gypsum board finish for locations as follows, in accordance with GA 214-21.

.1 Level 1: Ceiling plenum areas and concealed areas, except provide higher level of finish as required to comply with fire resistance ratings and acoustical ratings.

.2 Level 2: Gypsum board substrate at applied hard surfaces, except remove tool marks and ridges.

.3 Level 4: Exposed gypsum board surfaces, except where another finish level is indicated.

.2 Interior gypsum board:

.1 Prefill:

.1 Use setting-type joint compound. Mix joint compound according to manufacturer's written requirements.

.2 Fill joints between boards flush to top of eased or beveled edge.

.3 Fill joints of gypsum board above suspended ceilings in fire rated partitions.

.4 Wipe off excess compound and allow compound to harden.

.5 Prefill joint gaps not greater than 3.2 mm (1/8") with either ready-mix or setting type joint compound; prefill joint gaps greater than 3.2 mm (1/8") with setting-type joint compound.

.2 Taping (Level 1):

.1 Butter taping compound into inside corners and joints.

.2 Centre tape over joints and press down into fresh compound.

.3 Remove excess compound.

.4 Tape joints of gypsum board above suspended ceilings.

.3 First coat (Level 2):

.1 Use taping or all-purpose drying-type compound.

.2 Immediately after bedding tape, apply skim coat of compound and allow to dry completely in accordance with manufacturer's written requirements.

.3 Apply first coat of compound over flanges of trim and accessories, and over exposed fastener heads and finish level with board surface.

.4 Cover fastener heads and accessories with 1 coat of joint compound.

.4 Second coat (Level 3): After first coat treatment is dried, apply second coat of compound over tape and trim, feathering compound 50 mm (2") beyond edge of first coat.

.1 Cover fastener heads and accessories with total of 2 separate coats of joint compound.

.5 Third coat (Level 4):

.1 After second coat has dried, sand surface lightly and apply thin finish coat to joints, fasteners and trim, feathering compound 50 mm (2") beyond edge of second coat.

.2 Allow third coat to dry. Apply additional compound, and touch-up and sand, to provide surface free of visual defects, tool marks, and ridges, and ready for application of finish.

.3 Finished joints will be accepted with a camber not greater than 1 mm (1/32") and shall be seamless, plumb, true and flush and with square, neat corners.

.4 Cover fastener heads and accessories with total of 3 separate coats of joint compound.

.3 Interior mold and moisture resistant gypsum board: Treat fastener heads and joints with setting-type joint compound.

.1 For joints to be covered with tile, apply tape and joint compound bedding coat and skim coat only; do not apply finish coats.

.2 Do not crown joints or leave excess compound on panels.

.3 Remove tool marks and ridges.

.4 For fastener heads to be covered with tile, apply one coat of joint compound.

.4 Tile backer board: Prepare and finish joints in accordance with manufacturer's written requirements.

.5 Joint compound:

.1 Apply finish coat of compound feathering 75 to 100 mm (3” to 4”) beyond tape edges.

.2 Feather coats onto adjoining surfaces so that camber is maximum 0.79 mm (1/32”).

.6 Trim:

.1 Use same fasteners to anchor trim accessory flanges as required to fasten gypsum board to supports, unless otherwise recommended by trim manufacturer.

.2 Install metal corner beads at external corners.

.3 Install metal casing bead trim whenever edge of gypsum base would otherwise be exposed or semi exposed, and where gypsum base terminates against dissimilar material.

.4 Erect beads plumb or level, with minimum joints.

.7 Control joints:

.1 Provide control joints set in board facing. Support control joints with studs or furring channels on both sides of joint.

.2 Provide control joints in locations required and as indicated on reviewed shop drawings.

.1 Review control joint locations with Contract Administrator prior to installation.

.3 Install control joints where a partition, wall, or ceiling traverses a construction joint (expansion, or building control element) in the building structure.

.4 Install control joints where a wall or partition runs in an uninterrupted straight plane exceeding 9100 mm (30 linear feet).

.5 Install control joints in interior ceilings:

.1 With perimeter relief:

.1 Linear dimensions between control joints shall not exceed 15000 mm (50 ft) and total area between control joints shall not exceed 230 m² (2500 ft²).

.2 Without perimeter relief:

.1 Linear dimensions between control joints shall not exceed 9100 mm (30 ft) and total area between control joints shall not exceed 84 m² (900 ft²).

.6 Install control joints where ceiling framing members change direction.

.7 Where a control joint occurs in an acoustical or fire-rated system, provide blocking behind the control joint by using a backing material such as 16 mm (5/8") Type X gypsum panel products, mineral fibre, or other tested equivalent. Construct through-wall control joints at fire-rated assemblies in accordance with assembly listing requirements.

.8 Line up control joints with joints in other construction or with centre lines of mullions, columns, piers, or similar building elements, where accepted by Contract Administrator.

.9 Install control joints straight and true.

.10 Ceiling height door frames may be used as control joints. Less than ceiling height frames shall have control joints extending to the ceiling from both corners. If control joints are not used, additional reinforcement is required at corners to distribute concentrated stresses.

.11 Locate board joints so that no joint will align with the edge of an opening unless control joints are to be installed at these locations.

3.13 Adjusting and Cleaning

.1 Clean up and remove surplus materials and rubbish resulting from the work of this section upon completion.

.2 Clean off beads, casings, joint compound droppings and the like, leave the work of this section ready for painting trades.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Gypsum sheathing board at wall assemblies.

.2 Sheathing board accessories and miscellaneous related materials.

.2 Section excludes:

.1 Gypsum sheathing board at roof assemblies: in accordance with Section 07 52 16.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Fire-rated assembly listings:

.1 Submit fire-rated assembly listings for each required fire resistance rated assembly for work of this section.

.4 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Quality Assurance

.1 Qualifications:

.1 Subcontractor: Shall have 10 years' experience, minimum, in successful installation of work of type and quality indicated and specified.

1.4 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of Section 09 29 90.

.2 Handle gypsum panel Materials and accessories in accordance with GA 253-21 and GA 801-2023.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Single source responsibility:

.1 Provide gypsum board Materials from one manufacturer for the work of this section.

.2 Fire resistance rating:

.1 Construct fire resistance rated assemblies in accordance with listing and CAN/ULC S101-14.

2.3 Sheathing Board Panels

.1 Gypsum sheathing board:

.1 In accordance with ASTM C1177/C1177M-17.

.2 Exterior grade.

.3 Glass mat faced.

.4 Fire rated in accordance with listed assemblies where indicated: Type X or Type C.

.5 Acceptable Materials:

.1 CertainTeed 'GlasRoc Sheathing'.

.2 CGC 'Securock UltraLight Glass-Mat Sheathing'.

.3 Georgia-Pacific 'DensGlass Sheathing'.

2.4 Fasteners

.1 Screws: in accordance with exterior sheathing board manufacturer's installation requirements to comply with design wind loads.

.1 Provide thermoset polyester coated screws formulated to provide enhanced corrosion protection.

2.5 Accessories

.1 Joint sealants; penetrations, cutouts, or other small openings: In accordance with Section 07 92 00.

2.6 Related Support Assemblies

.1 Wind bearing metal studs at wind bearing exterior assemblies: in accordance with Section 05 41 13.

PART 3 - EXECUTION

3.1 Installation

.1 Gypsum sheathing board: Install sheathing in accordance with manufacturer's written requirements and applicable instructions in GA 253-21, ASTM C1280-13, and ASTM C1397-13(2019). Do not bridge building expansion joints with support system. Frame both sides of joints with furring and other supports as indicated.

.2 Use maximum board lengths to minimize number of joints. Stagger sheathing joints, offset by at least one framing member. Offset board joints 150 mm (6") minimum from corners of openings.

.3 Install sheathing with exterior board side facing exterior. Butt boards together for a light contact at edges and ends with not more than 1.6 mm (1/16") open space between boards. Do not force into place.

.4 Drive fasteners to bear tight against and flush with surface of sheathing. Do not countersink.

.5 Locate fasteners minimum 10 mm (3/8") from edges and ends of sheathing boards.

.6 Provide fasteners in accordance with manufacturer's written requirements to comply with design wind loads.

.7 Provide clearances between work of this section and structural elements to prevent transference of structural loads, and in no case less than 16 mm (5/8").

.8 Sheathing shall not be continuous through building construction joints.

.9 Replace damaged or weathered sheathing boards.

3.2 Fire Rated Assemblies

.1 Install fire-rated assemblies in accordance with assembly listing requirements in order to obtain fire ratings indicated and as required by authorities having jurisdiction.

.2 Use fire rated sheathing panels as specified.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Interior hard surface tiling.

.2 Mortar bed for tiling.

.3 Thin-set mortar for tiling.

.4 Levelling underlayment.

.5 Sheet uncoupling membrane.

.6 Waterproofing/crack isolation membrane.

.7 Crack isolation membrane.

.8 Trim accessories.

1.2 References

.1 Definitions:

.1 Large format tile: Tiles with dimension measured along any edge 380 mm (15”) and greater.

1.3 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.2 Sequencing and scheduling:

.1 Coordinate installation of tile work with related work.

.2 Proceed with tile work only after curbs, vents, drains, piping, and other projections through substrate have been installed and when substrate construction and framing of openings have been completed.

1.4 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.2 Submit manufacturer’s installation requirements for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Indicate location and sizes of expansion and control joints.

.4 Samples:

.1 Submit 3 -full size samples of each type of tile specified.

.2 Submit 3 -full size samples of each unglazed tile, fully grouted (4 tiles) with selected grout colours to determine whether staining will be a problem.

.3 Submit 3 - 305 mm (12") long samples trim accessory.

.4 Submit 3 - 305 mm (12") long samples of control joint sealant.

.5 Test and evaluation reports:

.1 Submit moisture, alkalinity, and mortar bond test results.

.6 Tiling system manufacturer's system warranty and design criteria:

.1 Submit tiling system manufacturer's warranty specimen and warranty design criteria prior to the commencement of work of this section.

.7 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.5 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance requirements for inclusion in the operation and maintenance manuals.

.3 Maintenance materials:

.1 Provide minimum 2% of each type and colour of tile required for the Work for maintenance use.

.2 Maintenance material to be of same production run as installed material.

1.6 Quality Assurance

.1 Qualifications:

.1 Subcontractor:

.1 Has adequate plant, equipment, and skilled workers to perform the work expeditiously.

.2 Has successfully completed installations similar to that specified during a period of at least the immediate past 5 years.

.3 Shall be a member company in good standing of the Terrazzo, Tile and Marble Association of Canada and have been a member for at least the past 5 years.

.2 Mock-ups:

.1 Grouted mock-up: 1220 mm x 1220 mm (48" x 48") sample panels of each tile type and colour, texture, size, and pattern of tile and grout.

.2 Submit dry-lay sample installation: 1220 mm x 1220 mm (48" x 48") area for each type and finish required to verify sample selections.

.3 Install each Material and colour mock-up for acceptance by Contract Administrator. Accepted mock-up shall form basis of standard of workmanship for remainder of work.

.4 Mock-up shall consist of floor/wall/base corner intersection, with 300 mm (12") of finish Material on each face and expansion and control joints.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 System:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

.2 System:

.1 The warranty is a tiling system manufacturer's system warranty.

.2 Labour, materials, and workmanship for work of this section.

.3 Duration: 10 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Single source responsibility:

.1 In any given space, use mortar and grout from a single manufacturer.

.2 Tile Materials shall be from same production run, dye lot, calibre, and batch number. If shading variation is evident, notify Contract Administrator prior to installation.

.3 ANSI - American Standard Specification for the Installation of Ceramic Tile.

.4 Terrazzo, Tile and Marble Association of Canada (“TTMAC”) TTMAC Tile Installation Manual, Specification Guide 09 30 00, 2025.

.5 Slip resistance: Floors shall have a wet Dynamic Coefficient of Friction (DCOF) of 0.42 or greater in accordance with ANSI A326.3.

.6 Tiling systems shall exhibit none of the following once installed:

.1 Waterproofing under tile assemblies that fails to remain watertight.

.2 Staining or discolouration of tile due to mortar or grout.

.3 Delaminating of tile.

.4 Cracked or chipped tiles.

.5 Cracked grout.

2.3 Tile Materials

.1 Tile (TL):

.1 Material, colour, finish and size: Refer to Material Schedule.

.2 At TL1, TL2, provide:

.1 Sheet waterproofing / crack isolation membrane in rooms or areas with toilets or showers.

.2 Uncoupling membrane at slabs on grade in tiled areas without plumbing fixtures.

.3 Crack isolation membrane at suspended slabs or wood framing without plumbing fixtures.

.4 Mortar bed.

.5 Levelling underlayment.

.3 At TL3, TL4, TL5, TL6, provide:

.1 Sheet waterproofing / crack isolation membrane.

.2 Tile base (TLB):

.1 Material, colour, finish and size: Refer to Material Schedule.

2.4 Mortar Materials

.1 Unless otherwise specified, select from the following thin-set mortar:

.1 Latex modified Portland cement thin set mortar gauged:

.1 ANSI A118.4 (ANSI A108/A118/A136.1-20) and ANSI A118.11 (ANSI A108/A118/A136.1-20).

.2 White colour for translucent tile applications.

.3 Acceptable Materials:

.1 Ardex ‘X77 Microtec Fiber Reinforced Mortar’ with Ardex ‘E90 Mortar Admix’.

.2 Custom Building Products ‘ProLite’.

.3 Flextile ‘51’ mixed with Flextile ‘44’.

.4 Mapei 'KERALASTIC' mixed with 'KERABOND'.

.5 Promo Adhesives Inc. ‘Pro Bond Plus’ with ‘Pro Bond Plus Additive’.

.6 TEC ‘Superflex Ultra-Premium Thin Set’.

.2 Enriched, modified, Portland cement thin set mortar, single component, with integral polymer:

.1 ANSI A118.4 (ANSI A108/A118/A136.1-20) and ANSI A118.11 (ANSI A108/A118/A136.1-20).

.2 White colour for translucent tile applications.

.3 Acceptable Materials:

.1 Ardex ‘X 5 Flexible Tile & Stone Mortar’.

.2 Custom Building Products ‘Versabond LFT’.

.3 Flextile ‘52’.

.4 Laticrete ‘254 Platinum Multipurpose Thin-Set Mortar’.

.5 Mapei ‘Ultraflex RS’.

.6 Promo Adhesives Inc. ‘Pro HPX’.

.7 TEC ‘Ultimate Large Tile Mortar’.

.2 Special mortar and setting materials:

.1 Mortar for large format tiles meeting definition under paragraph 1.2.1.1:

.1 Enriched, modified, fast-set Portland cement medium bed mortar high-hydration, low residual moisture behind the tile formula.

.2 ANSI A118.4 (ANSI A108/A118/A136.1-20) and ANSI A118.11 (ANSI A108/A118/A136.1-20).

.3 Substrate primer: in accordance with manufacturer’s installation requirements.

.4 White colour for translucent tile applications and light coloured stones.

.5 Acceptable Materials:

.1 Ardex 'S 28 Microtec Rapid Hardening and Rapid Drying Semi-Pourable Natural Stone Floor Tile'.

.2 Custom Building Products: ‘MegaLite’.

.3 Flextile ‘58XT’.

.4 Mapei ‘Granirapid’.

.5 Laticrete ‘4-XLT Rapid’.

.6 Promo Adhesives Inc. ‘Pro Quick SF’ with ‘Pro Quick Plus Additive’.

.7 TEC ‘Fast Set Ultimate Large Tile Mortar’.

.8 TEC ‘Fast Set 3N1 Performance Mortar’.

.2 Latex-Portland cement mortar for thick beds, levelling screed beds and scratch coats:

.1 ANSI A118.4 (ANSI A108/A118/A136.1-20) and ANSI A118.11 (ANSI A108/A118/A136.1-20).

.2 Acceptable Materials:

.1 Ardex ‘A 38 Rapid Hardening and Drying Cement for Floor Screeds in Internal or External Locations'.

.2 Custom Building Products ‘SpeedSlope’.

.3 Custom Building Products ‘Thick Bed Bedding Mortar’.

.4 Flextile ‘4:1 Dry Pack Mortar mixed with Flextile ‘44’.

.5 Laticrete ‘226 Thick Bed Mortar’ gauged with Laticrete ‘3701 Mortar Admix’.

.6 Mapei ‘Ultraflex LFT’.

.7 Promo Adhesives Inc. ‘Pro P-151 SF’.

.8 TEC ‘Floor Mud’.

.3 Mortar beds, levelling coats:

.1 Materials:

.1 Water: clean and free of chemicals detrimental to mortar and grout mixes.

.2 Sand: to ASTM C144-18, passing 16 mesh.

.3 Cement: to CSA A3002-13, Type U.

.4 Latex: Formulated for use with Portland cement mortars.

.5 Cleavage membrane: 0.10 mm (4 mil) thick polyethylene film to CAN/CGSB 51.34-M86.

.6 Reinforcing mesh: 51 mm x 51 mm (2” x 2”) mesh size, fabricated from 1.6 mm (0.06") thick galvanized steel wire; welded fabric design.

.2 Mixes:

.1 Scratch coat (by volume): 1 part Portland cement, 4 parts sand, and water or latex where required by TTMAC detail. Premixed mortar may be used per manufacturer’s requirements. Adjust liquid volume may be adjusted depending on water content of sand to obtain consistency and workability.

.2 Slurry bond coat: Mix Portland cement and water to a creamy paste consistency. Include latex additive where required by TTMAC detail.

.3 Mortar bed for walls (by volume): 1 part Portland cement, 4 parts sand, and water or latex where required by TTMAC detail. Premixed mortar may be used per manufacturer’s requirements. Adjust liquid volume may be adjusted depending on water content of sand to obtain consistency and workability.

.4 Levelling coat (by volume): 1 part Portland cement, 4 parts sand, and water or latex where required by TTMAC detail. Premixed mortar may be used per manufacturer’s requirements. Adjust liquid volume may be adjusted depending on water content of sand to obtain consistency and workability.

.5 Mortar bed for floors (by performance): 1 part Portland cement, 4 parts sand, and water or latex where required by TTMAC detail. Premixed mortar may be used per manufacturer's requirements. Adjust liquid volume may be adjusted depending on water content of sand to obtain consistency and workability that will allow compaction during tamping of the mortar bed, and achieve minimum compressive strength of 15 MPa after 28 days.

.4 Levelling underlayment:

.1 Cement-based, quick-setting, self-levelling, self-drying underlayment for installations from featheredge to minimum 32 mm (1") thick in single application.

.2 Primer: Type as recommended by levelling underlayment manufacturer to suit substrate.

.3 Acceptable Materials:

.1 Ardex 'Liquid BackerBoard Self-Levelling Underlayment'.

.2 Ardex 'TL 1000'.

.3 Custom Building Products 'TechLevel 100'.

.4 Flextile '5900 Flex-Flo Plus Self-Levelling Underlayment'.

.5 Laticrete 'Supercap SC500'.

.6 Mapei 'Ultraplan 1 Plus'.

.7 Promo Adhesives Inc. 'Pro Plan'.

.8 TEC 'Contractor Grade Self Levelling'.

.9 TEC 'Levelset 200'.

2.5 Grout Materials

.1 High performance polymer-modified grout:

.1 Weather, frost and shock resistant.

.2 ANSI A118.7 (ANSI A108/A118/A136.1-20).

.3 Acceptable Materials:

.1 Custom Building Products: 'Prism Ultimate Performance Grout'.

.2 Laticrete 'PermaColor Grout'.

.3 Mapei 'Ultracolor Plus FA'.

.4 Promo Adhesives Inc. 'Pro Topgrout'.

.5 TEC 'Power Grout'.

.2 Grout colours to later selection by Contract Administrator from manufacturer's full range.

.3 Grout sealer: as recommended by grout manufacturer.

2.6 Sheet Uncoupling Membrane Materials

.1 Review floor assembly design (live load deflection) with Contract Administrator and uncoupling membrane manufacturer's representative. Confirm uncoupling membrane manufacturer's recommended Material to Contract Administrator in writing, on uncoupling membrane manufacturer's company letterhead prior to commencing the installation.

.2 Uncoupling membrane:

.1 Extra Heavy Service rating tested to ASTM C627-18 on concrete substrates with 305 mm (12") x 305 mm (12") x 8 mm (5/16") nominal thick porcelain tile.

.2 Mortar; for setting tile: Compatible Material as recommended by sheet uncoupling membrane manufacturer.

.3 Acceptable Materials:

.1 Ardex 'UI 720' Flexbone'.

.2 Ardex 'UI 740 Flexbone'.

.3 Custom Building Products: 'Redgard Uncoupling Mat'.

.4 Flextile 'FlexMat'.

.5 Mapei 'Mapeguard UM'.

.6 Schluter 'Ditra'.

.7 Schluter 'Ditra XL'.

.3 Accessories:

.1 Mortar; for setting tile: Compatible Material as recommended by sheet uncoupling membrane manufacturer.

2.7 Waterproofing/Crack Isolation Membrane Materials

.1 Review floor assembly design (live load deflection) with Contract Administrator and crack isolation membrane manufacturer's representative. Confirm crack isolation manufacturer's recommended Material to Contract Administrator in writing, on crack isolation membrane manufacturer's company letterhead prior to commencing the installation.

.2 Waterproofing/crack isolation membrane; interior immersion water conditions:

.1 Thin, flexible, liquid or trowel applied, load bearing waterproofing system. Waterproofing/crack isolation membrane materials meet or exceed ANSI A118.10 (ANSI A108/A118/A136.1-20) and ANSI A118.12 (ANSI A108/A118/A136.1-20) and IAPMO certificate of listing as a shower pan liner. Materials to be non-toxic, non-flammable, and non-hazardous during storage, mixing, application and when cured.

.2 Accessories:

.1 Reinforcing fabric/mesh to be non-woven rot-proof specifically intended for waterproofing membrane as recommended by waterproofing/crack isolation membrane manufacturer.

.2 Mortar; for setting tile: Compatible Material as recommended by waterproofing/crack isolation membrane manufacturer.

.3 Acceptable Materials:

.1 Ardex ‘8+9 Waterproofing and Crack Isolation Compound’.

.2 Custom Building Products ‘RedGard Waterproofing and Crack Prevention Membrane’.

.3 Flextile ‘WP980 Waterproof & Crack Isolation Membrane’.

.4 Laticrete ‘Hydro Ban’.

.5 Laticrete ‘9235 Waterproofing Membrane.

.6 Mapei ‘Mapelastic AquaDefense’.

.7 Mapei ‘Mapelastic Turbo’

.8 Promo Adhesives Inc. ‘Pro MBR XD’.

.9 TEC ‘Hydraflex Waterproofing Crack Isolation Membrane’.

2.8 Crack Isolation Membrane

.1 Review floor assembly design (live load deflection) with Contract Administrator and crack isolation membrane manufacturer’s representative. Confirm crack isolation manufacturer’s recommended Material to Contract Administrator in writing, on crack isolation membrane manufacturer’s company letterhead prior to commencing the installation.

.2 Crack isolation membrane shall be thin, flexible, cold applied, load bearing, ANSI A118.12 (ANSI A108/A118/A136.1-20) with Extra Heavy Service rating tested to ASTM C627-18 on concrete substrates. Materials to be non-toxic, non-flammable, and non-hazardous during storage, mixing, application and when cured.

.1 Accessories:

.1 Reinforcing fabric to be non-woven rot-proof specifically intended for crack isolation membrane as recommended by crack isolation membrane manufacturer.

.2 Mortar; for setting tile: Compatible Material as recommended by crack isolation membrane manufacturer.

.2 Acceptable Materials:

.1 Ardex ‘8+9 Waterproofing and Crack Isolation Compound’.

.2 Custom Building Products ‘Crack Buster Pro’.

.3 Flextile 1000 Flexilastic’.

.4 Flextile ‘WP980 Waterproof & Crack Isolation Membrane’.

.5 Laticrete ‘Blue 92 Anti-Fracture Membrane’.

.6 Mapei ‘Mapeguard 2’.

.7 Promo Adhesives Inc. ‘Pro CBM Membrane’.

.8 TEC ‘Hydraflex Waterproofing Crack Isolation Membrane’.

2.9 Accessories and Related Materials

.1 Trim accessories:

.1 Finishing and edge protection; walls: Schluter ‘JOLLY’.

.2 Finishing and edge protection; floors: Schluter ‘SCHIENE’.

.3 Tile to Gymnasium and Movement Studios: Schluter ‘DILEX-BTS’.

.4 Tile to resilient flooring: Schluter ‘RENO-V’.

.5 Tile to carpet: Schluter ‘RENO-V’.

.6 Tile to epoxy flooring: Schluter ‘RENO-U’.

.7 Tile to running track: Schluter ‘SCHIENE’.

.8 Tile to fitness flooring: Schluter ‘RENO-TK’.

.9 Stair nosing: Schluter ‘TREP-TAP’, anodized aluminum finish.

.2 Joint sealants: mildew resistant sealant in accordance with Section 07 92 00.

.3 Expansion and control joints

.1 Expansion joint sealant:

.1 One-component, neutral cure, exterior grade silicone sealant.

.2 Tensile strength (ASTM C794-18(2022)): 1.5 MPa (225 psi).

.3 Hardness (ASTM D751-19; Shore A): Minimum 25 (colored sealant)/15 (clear sealant).

.4 Weather Resistance (QUV Weather-ometer): No change after 10,000 hours.

.5 Acceptable Materials:

.1 Flextile ‘Ultra Performance Caulk’.

.2 Laticrete ‘Latasil Tile and Stone Sealant’.

.3 Mapei ‘Mapesil T’.

.2 Control joint sealant:

.1 One-component, neutral cure, exterior grade silicone sealant.

.2 Tensile strength (ASTM C794-18(2022)): Minimum 1.5 MPa (225 psi).

.3 Hardness (ASTM D751-19; Shore A): Minimum 15.

.4 Weather resistance (QUV Weather-ometer): No change after 10,000 hours.

.5 Acceptable Materials:

.1 Ardex ‘SX’.

.2 Flextile ‘Tile & Grout Caulk’.

.3 Laticrete ‘Latasil Tile and Stone Sealant’.

.4 Mapei ‘Mapesil T’.

.5 TEC ‘Accucolour 100% Silicone Sealant’.

.3 Expansion and control joint trim:

.1 Movement profile with edge protection, consisting of side anchoring legs of brass, aluminum, or stainless steel connected to a 20-mm or 30-mm-wide movement zone of soft synthetic rubber:

.1 Acceptable Materials:

.1 Schluter 'DILEX-KSBT'.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Expansion joint made of aluminum or brass with lateral joint connections to a sliding telescopic centre section, to allow for absorption of three-dimensional movement:

.1 Acceptable Materials:

.1 Schluter 'DILEX-BT'.

.2 Substitutions: in accordance with Section 01 25 00.

PART 3 - EXECUTION

3.1 Examination

.1 Ensure compatibility of Materials supplied under this section, and which bear contact with substrate.

.2 Before work of this section commences, examine the areas to be covered and report any flaw or adverse conditions in writing to the Contractor and the Contract Administrator. Do not proceed with work until surfaces and conditions comply with the requirements indicated in the manufacturer's requirements and in ANSI A108.5 (ANSI A108/A118/A136.1-20) specification.

.3 Miscalibrated tiles, tiles with chipped corners, tiles with holes, will not be accepted for installation.

.4 Inspect tiles for colour variation. Tiles presenting noticeable variations shall be carefully selected, set aside and used in areas where they fit in the pattern homogeneously. Provide for appropriate lighting equipment in addition to existing lighting in the immediate area where the installation is being performed so that any shade differences which are normally very slight can be identified easily.

3.2 Preparation

.1 Completely remove contaminants and deleterious substances and debris which may prevent, reduce, and affect adhesion or performance or may act as bond breaker.

.2 Wire brush steel substrates to remove deleterious substances and rust, to promote full adhesion to steel.

.3 Roughen surfaces with previously painted glossy finishes by sandpaper or other abrasive medium, and completely remove finishes which are not compatible with Materials specified under this section.

.4 Prime gypsum, wood or porous concrete with primer, brush or roller applied at full strength in accordance with mortar manufacturer's recommendations.

.5 Floor surfaces:

.1 Prepare concrete to receive levelling underlayment in accordance with International Concrete Repair Institute (ICRI) designation CSP-3.

.2 Prepare concrete to receive waterproofing membrane in accordance with International Concrete Repair Institute (ICRI) designation CSP-2.

.3 Concrete shall be minimum of 90 days old.

.4 At door opening locations where finished flooring is adjacent to weather-stripping or automatic door bottoms provide trowel-applied levelling compound to provide full contact between finished flooring and weather-stripping or automatic door bottoms. Taper trowel-applied levelling compound to transition with adjacent flooring substrate to be provide smooth and seamless transition at maximum slope of 3:1000 (height to distance) ratio.

.6 Concrete shall be dry with maximum allowable moisture in accordance with Material manufacturer's written requirements for Materials to be installed directly over concrete.

.7 Where a slab depression has been provided for tile assembly and depression exceeds maximum depth for setting bed materials per manufacturers' written requirements, provide levelling bed to bring depression to depth that complies with setting bed materials manufacturers' written requirements.

.8 Alkalinity, moisture, and adhesion testing:

.1 Perform moisture and alkalinity tests and mortar bond test.

.2 Where concrete substrate exhibits higher than permitted moisture and alkalinity levels, provide water vapour reduction system and repeat moisture and alkalinity tests and mortar bond tests.

.3 Proceed with installation only after substrates pass testing. Document tests performed and submit in writing to Contract Administrator.

3.3 Mixing

.1 Mix mortars, additives and grouts in accordance with manufacturer's written requirements.

3.4 Levelling Underlayment Installation

.1 Install levelling underlayment to tile flooring assemblies utilizing large format tile, except for large format tile installations over mortar bed sloped to drain.

.2 Mix and apply primer to prepared subfloor. Allow to dry prior to installation of levelling material.

.3 Mix and apply levelling material in accordance with manufacturer's written requirements to produce a smooth, flat surface.

.1 Apply levelling underlayment to provide substrate surface flatness tolerances to achieve F_F 60 in accordance with ASTM E1155-14 or 3 mm (1/8") with a 3000 mm (10'-0") straightedge.

.4 Allow to set prior to installation of tile.

3.5 Sheet Uncoupling Membrane Installation

.1 Levelling and sloping of substrates shall be completed prior to installation of uncoupling membranes.

.2 Remove dust, dirt, oil, grease, paint, laitance, efflorescence, curing compounds, sealers, water repellents and other deleterious materials that prevent bond. Metal plumbing pipe penetrations and fixtures must be clean of oil, grease, rust and other potential bond breakers.

.3 Install uncoupling membrane system to comply with manufacturer's written requirements.

3.6 Waterproofing/Crack Isolation Membrane Installation

.1 Install waterproof/crack isolation membrane to locations as indicated or scheduled to provide watertight performance.

.2 Install waterproof/crack isolation membrane to provide watertight performance to the following locations:

.1 Install to shower floors and install on associated vertical surfaces up to underside ceiling.

.2 Install to associated washroom and custodial closet floor areas and adjacent vertical surfaces up to a minimum height of 150 mm (6").

.3 Install waterproofing/crack isolation membrane system to comply with ANSI A108.13 (ANSI A108/A118/A136.1-2017) and manufacturer's written requirements to produce waterproof/crack isolation membrane of uniform thickness, bonded securely to substrate.

.4 Concrete floors shall be dry with maximum allowable moisture in accordance with manufacturer’s written requirements.

.5 Drains shall be of the clamping ring type, with weepers.

.6 Embed reinforcing fabric/mesh into waterproofing/crack isolation membrane to achieve full contact and to remove air pockets.

.7 Seal waterproofing/crack isolation at penetrations and terminations.

.8 Apply waterproofing/crack isolation membrane coats at manufacturer’s recommended application rates.

.1 When last membrane coat has dried to the touch, inspect final surfaces for pinholes, voids, thin spots or other defects. Apply additional membrane coats seal defects in accordance with membrane manufacturer’s written requirements.

3.7 Crack Isolation Membrane Installation

.1 Install crack isolation membrane system to comply with manufacturer's written requirements.

.2 Install crack isolation membrane to tile flooring assemblies utilizing large format tile and as indicated.

.3 Install crack isolation membrane to substrates for tile flooring installations located on suspended structural floor assemblies. Treat substrate with full coverage of crack isolation membrane and reinforcement in accordance with crack isolation membrane manufacturer’s installation requirements.

3.8 Installation - General

.1 Install Materials in accordance with manufacturer's specifications and as indicated herein, in accordance with TTMAC 2019-2021 Tile Installation Manual, Specification Guide 09 30 00, and in accordance with ANSI A108.5 (ANSI A108/A118/A136.1-20) except where specified otherwise.

3.9 Thin-Set Method

.1 Make joints even, straight, plumb and of uniform width.

.2 Provide mortar beds and levelling coats in accordance with TTMAC details.

.3 Provide uniform positive slope to floor drains, to minimum allowable slope of 20 mm/m (1/4 inch/ft).

.4 At floor drains in mortar bed: Provide minimum setting bed of 10 mm (3/8"), sloped to drain at 20 mm/m (1/4 inch/ft).

.5 Provide edge protection at tile edges and corners, unless otherwise indicated, using maximum length pieces.

.6 Provide edge protection and transition strips at tile transitions, unless otherwise indicated, using maximum length pieces.

.7 Review locations of tile accessories with Contract Administrator prior to setting tile and comply with directions of Contract Administrator.

.8 Lap tile and seal with sealant at inside corners and bath/shower fixtures. Caulk around pipes and openings made in tile with sealant.

.9 Apply sealant at interface with frames at openings. Apply sealant in accordance with Section 07 92 00 and manufacturer’s requirements.

.1 Sealant colour to later selection by Contract Administrator.

.10 Install flooring to entire area indicated or scheduled. Unless otherwise indicated, include coverplates occurring within finished floor areas. Maintain overall uniform continuity of colour and pattern with pieces of flooring installed on cover plates. Tightly butt edges to perimeter of floor around cover plates and to cover plates. Do not install flooring to floor drains occurring within finished floor areas.

3.10 Tile Setting

.1 Lay out tile work as indicated on drawings, and where lay-out is not indicated, lay-out tiles so tiles less than 1/2 the least dimension do not occur and with minimum amount of cutting.

.2 Using a damp towel, wipe off the back side of tile to remove any dust or other residue that may be left over from the manufacturing process.

.3 Place as much tile as possible in one operation before setting bed reaches initial set. Clean back and remove bed when it has set before tile is laid.

.4 Prime materials and by methods specified by manufacturer of bond coat.

.5 Line up joints between tile installed on stairs from tread to tread.

.6 Except where tiles have setting tabs, and except for expansion, control and isolation joints, maintain joint widths as selected by Contract Administrator.

.7 Back up tile coves, curbs and other shaped pieces solid with mortar. Rigidly set, reinforce or otherwise make firm and secure such pieces.

.8 Beat tiles in thoroughly and sufficiently to cause mortar ribs or notches to come together into a continuous void free bed and allow the mortar to flow up partially into the joint space to maximum of 1/3 the thickness of the tile. Sound floor tiles by tapping and reset tiles with voids in setting bed.

.9 Tile shall contact setting materials for minimum of 95% coverage unless otherwise indicated.

.10 Obtain 100% mortar coverage with applicable requirements for back buttering of tile in referenced TTMAC and ANSI A108/A118/A136.1-20 series of tile installation standards for the following:

.1 Tile in wet areas:

.1 Showers.

.2 Laundries.

.2 Tile installed with chemical resistant mortars and grouts.

.3 Tile having any dimension 300 mm (12") or larger in any direction.

.4 Tile with raised or textured backs.

.5 Tile installation rated for Heavy or Extra Heavy Duty.

.6 Porcelain tiles with more than 20% of the tile backs covered with firing release dust back buttered so that 100% of the back is covered with mortar rated for C627, Extra Heavy Duty rating.

.11 Remove any excess setting material from the joint area so that 2/3 of the depth of the tile is available for grouting.

.12 Remove smudges or smears of setting material from the tile surface with a damp sponge or cloth immediately after final adjustment and beat-in while the mortar is fresh.

.13 Do necessary cutting and drilling of fixtures, fittings, and built-in or penetrating units without marring the tile. Replace cracked or damaged tile.

.14 Form external angles with round edge tile extending over edge of square edge adjacent tile. Internal angles shall be formed square, carrying 1 flat tile past edge of other.

.15 Extend tile into recesses at windows, doors, or other openings.

.16 Extend tiles 100 mm (4") behind mirrors, and fully behind cabinets, cupboards and other fixed objects at walls.

.17 Cut tiles to conform to irregularities in wall lines and vertical planes along outer edges. Smooth cut edges with carborundum block or by other means to provide clean straight edge.

.18 Install tiles to provide even distribution of shading, colour, and characteristics.

3.11 Control and Expansion Joints

.1 Install control joints and expansion joints in tile work in accordance with TTMAC Detail 301MJ-2019-2021 in floors and walls and at perimeters of floors, around columns and where tile abuts other hard materials and as indicated or in accordance with the following table:

Environment	Minimum	Maximum	Minimum Joint Width
Interior/Shades	4800 mm	6100 mm	6 mm
Interior/Sunlight	2400 mm	3700 mm	6 mm
Exterior/Normal	2400 mm	3700 mm	10 mm
Exterior/Excessive	2400 mm	3000 mm	13 mm

.1 Review locations with Contract Administrator prior to setting tile and comply with instruction given by Contract Administrator.

.2 Carry substrate control and movements joints through to tile work.

.3 Incorporate expansion joints over building expansion joints.

.4 Cut tiles on both sides along the edges of control or expansion joints.

.5 Manufactured control joint trim: in accordance with “Accessories and Related Materials” paragraph.

3.12 Trim Accessories Installation.

.1 Install trims in accordance with manufacturer’s written requirements.

.2 Install in continuous lengths.

.3 Scribe and fit to obstructions.

.4 Mitre corners.

.5 Tile shall be installed flush with top surface of trim accessory with tolerance of 1 mm (1/32") lower than the top surface of trim accessory. The trim accessory shall not be higher than the tiled surface. A joint of 3 mm (1/8") shall be left between the tile and the profile to be filled with grout.

3.13 Grouting

.1 Install grout to comply with ANSI A118.4 (ANSI A108/A118/A136.1-20) unless otherwise specified and in accordance with manufacturer's written requirements.

.2 Allow tile installation to cure a minimum of 24 hours prior to grouting.

.3 Grout joints shall be free of dirt, debris, water or tile spacers and face of tiles are clean.

.4 Apply a coat of grout release and achieve 100% surface covered of tile following grout release manufacturer’s written requirements.

.5 Pack joints full and free of voids/pits.

.6 Allow grout joints to become firm. Inspect joint for pinholes/voids and repair them with freshly mixed grout. Within 24 hours, check for remaining haze and remove it with warm soapy water and a nylon scrubbing pad, using a circular motion, to lightly scrub surfaces and dissolve haze/film.

.7 Grout joint width to be 3.2 mm (1/8") unless otherwise indicated; except at mosaic type tiles on paper or mesh backed sheets.

.8 Use caution when using sanded grouts to prevent scratching of tile or other material surfaces.

.9 Do not cover, bridge or fill any expansion joints in tile with grout.

3.14 Tile Installation Tolerances

.1 Maximum allowable lippage:

.1 Tile up to 152 mm x 152 mm (6" x 6") in size: 1 mm (0.040”).

.2 Tile greater than 152 mm x 152 mm (6" x 6") in size: 2 mm (0.080”).

.2 Finish planes shall be straight and plumb to within 6 mm in 3 m (1/4” in 10 feet).

3.15 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.1 Field tests and inspections:

.1 For concrete floor substrates subject to moisture sensitive materials, conduct the following tests in accordance with the following:

.1 Test for moisture vapour transmission in accordance with ASTM F710-22 and ASTM F1869-22 or ASTM F2170-19a in accordance with manufacturer’s written installation requirements. Results must not exceed the written recommendations of the Material manufacturer.

.2 Test for surface pH. Levels of pH shall not exceed the written recommendations of the Material manufacturer. Test in accordance with ASTM F710-22.

.3 For each test type: Conduct 3 tests for flooring applications up to 93 m^2 (1000 square feet) in area, and 1 additional test for each additional 93 m^2 (1000 square feet) of flooring area.

.4 Testing shall be conducted by independent inspection and testing company and in accordance with Section 01 45 00.

.2 Adhesion bond test:

.1 Proceed with bond test after substrates have been prepared and alkalinity and moisture test have been completed.

.2 Adhesion bond test shall be completed in accordance with tile flooring and mortar setting manufacturer’s written requirements and in accordance with the independent inspection and testing company’s requirements.

.3 Using the specified mortar, set test tiles using mortar manufacturer’s recommended trowel.

.4 After pre-determined duration, attempt to remove the test tiles by pulling up from the corners.

.5 Using the specified mortar, set test tiles using mortar specified and to comply with specifications.

.6 After tiles have set and after duration of time as specified by independent inspection and testing company, commence pull off test to determine bonding strength of mortar between tile and substrate. Testing specimen sizes and number of tests including locations of tests shall be as directed by independent inspection and testing company.

.7 Minimum bonding strength requirements shall be as determined by independent inspection and testing company.

.8 Independent inspection and testing company shall determine and have final word if tile adhesion is adequate.

.9 Testing shall be conducted by independent inspection and testing company and in accordance with Section 01 45 00.

.2 Manufacturer shall provide field review in accordance with Section 01 45 00.

.1 Tiling system manufacturer's field representative shall be on-site and review system installation (minimum of 2 visits) during installation of the work of this section and provide written site reports to the Contract Administrator certifying that the Materials are being installed in accordance with the warranty system requirements.

3.16 Adjusting and Cleaning

.1 Clean installed tile surfaces after grouting has cured.

.2 Re-point joints after cleaning to eliminate imperfections. Avoid scratching tile surfaces.

3.17 Protection

.1 Protect work of this section against damage by work of other sections for a minimum of 72 hours after application of grouting by prohibiting passage of traffic over tile. Do not immerse in water and protect tilework from freezing for at least 28 days after installation.

.2 Protect floors from impact and vibration for a minimum of 48 hours after installation.

.3 Install floor protection in areas where other work, repairs and installation of equipment, and foot traffic will occur.

.4 Where latex or polymer additives are used in mortar materials, materials shall be cured a minimum of 14 days before exposure to moisture and before water immersion and longer as included in mortar manufacturer's written requirements.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Acoustical panel ceiling systems; (ACP1).

1.2 Administrative Requirements

.1 Coordination:

.1 Coordination of work: coordinate layout and installation of acoustic ceiling units and suspension systems components with other work supported by or penetrating through ceilings, including light fixtures, HVAC equipment, partition system and fire suppression system components.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Submit shop drawings, indicating panel layout and system components, for each panel system.

.2 Include plans, sections and large scale details, and indicate components and methods of assembly, materials and their characteristics, fastenings, finishes, and other fabrication information required for the work of this section. Indicate assembly joint lines.

.3 Submit coordination drawings indicating locations of concealed grounds, cutouts, plates, and other required fabrications.

.4 Show relation to adjoining construction, details of outside and inside corners and door openings.

.4 Samples:

.1 Submit 2 - 300 mm (12") x 300 mm (12") samples of each component of panel system to Contract Administrator for review.

.2 Samples shall fully represent materials to be supplied in colour, texture, finish and construction.

.5 Acoustic data:

.1 Submit acoustic data verifying that Materials meet specified acoustic design requirements.

.2 Acoustic data submitted shall be from a certified acoustic testing agency.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer’s operation and maintenance instructions for inclusion in the operation and maintenance manuals.

.3 Maintenance materials:

.1 Deliver for maintenance use, 2% of each type and colour of panels used in the Work.

.2 Pack panels in suitable containers, clearly dated and identified as to type and location of installation in the Work, and store where directed by City.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 5 years’ experience, minimum, in application of Materials, systems and assemblies specified.

.2 Mock-ups:

.1 Install at the Site a pre-selected job mock-up of full size panel system with typical integrated lighting fixtures.

.2 Obtain Contract Administrator’s acceptance of surface, finish and workmanship as a standard by which remainder of the project will be judged. Apply material in accordance with manufacturer's written application requirements. Mock-up must be approved and accepted prior to start of system application. Maintain mock-up during construction for workmanship comparison. Do not alter, move or destroy mock-up until the work is completed and approved by Contract Administrator.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranties:

.1 Manufacturer’s Material warranty for the acoustical panels:

.1 Duration: 10 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Single source responsibility:

.1 For each type of acoustical ceiling panel, provide Materials from one manufacturer for the work of this section, including support systems, accessory Materials, and materials.

.1 Where manufacturer does not manufacture or supply required accessory Materials, any such accessory Materials supplied for use in the Work shall have approval from manufacturer for use as part of the final warrantied installation.

.2 Acoustical panel Materials installed as part of the work of this section shall be from same production run.

.2 The following minimum performance criteria apply to the systems to be provided as part of the work of this section, unless otherwise indicated or specified:

.1 Fire performance: flame spread 25 or less, smoke developed 50 or less, in accordance with CAN/ULC-S102-10.

.2 Panel deflection, when installed, shall not exceed 1/360th of the span.

2.3 Materials

.1 ACP1; Acoustical panel ceiling systems:

.1 Classification: Type B, Form B2, Pattern E or G in accordance with ASTM E1264-23.

.2 Sizes and thickness: Refer to Material Schedule.

.3 Grid profile: Refer to Material Schedule.

.4 Colour: Refer to Material Schedule.

.5 NRC: 0.95, measured in accordance with ASTM C423-23.

.6 Acceptable Material: Refer to Material Schedule.

.7 Suspension system:

.1 Acceptable Material: Refer to Material Schedule.

.2 Edge trim: Refer to Material Schedule.

.3 Colour: Flat white 050.

PART 3- EXECUTION

3.1 Installation

.1 Do not start installation until exterior glazing has been completed and exterior openings are closed in. Ensure wet work is completed and dried out to a degree acceptable to panel manufacturer before installation is commenced. Maintain uniform temperatures of at least 16°C for 72 hours prior to commencement of the work of this section and maintain temperature until completion of the work of this section.

.2 Do not commence installation until work above suspended ceiling has been completed, inspected and accepted.

.3 Panel arrangements as indicated. Coordinate layout with Contract Administrator prior to commencing installation. Lay out system to a balanced grid design, with edge units not less than 50% of acoustical unit size.

.4 Install finished work rigid, secure, square, level and plumb, framed and erected to maintain dimensions and contours indicated. Make allowance for thermal and structural movement.

.5 Install ceiling panels and metal suspension system in accordance with ASTM C636/C636M-19, and manufacturer's directions. Where manufacturer's directions are at variance with Contract Documents, notify Contract Administrator before proceeding with installation.

.6 Suspension system:

.1 Install in accordance with Section 09 51 23 and acoustical panel system manufacturer’s requirements and recommendations.

.7 Panels:

.1 Install acoustical panels to clean, dry and firm substrates in accordance with manufacturer’s written requirements.

.2 Panels shall have no visible fastenings. Faces of panels and bulkheads must be flush.

.8 Installation tolerance: Maximum variation from flat and level surface is 1:360.

3.2 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.1 Inspection and testing company may perform random load tests for ceiling anchor installation.

3.3 Adjusting and Cleaning

.1 Carefully examine suspended acoustical ceilings on completion and replace uneven or defective or damaged materials, eliminate waves, remedy damaged exposed finished surfaces and remove soiled or stained areas.

.2 Clean dirty and discoloured surfaces of acoustical units and suspension system according to manufacturer's recommendations.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Acoustical tile ceiling systems (ACT1, ACT2, ACT3).

1.2 Administrative Requirements

.1 Coordination:

.1 Cooperate with mechanical and electrical Subcontractors.

.2 Coordinate layout and installation of acoustic ceiling units and suspension systems components with other work supported by or penetrating through ceilings, including light fixtures, HVAC equipment, partition system, fire suppression system components and other work required to be incorporated in or coordinated with the ceiling system.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Submit manufacturer's standard details.

.2 Indicate lay-out, insert and hanger spacing and fastening details, splicing method for main and cross runners, location of access splines, and acoustical unit support at ceiling fixture.

.3 Submit reflected ceiling plans for special grid patterns as indicated.

.4 Samples:

.1 Submit sample of each component of ceiling system. Samples shall fully represent materials to be supplied in colour, texture, finish and construction.

.2 Submit samples, load test data and design tables for each type of insert to be used in the Work for hanger supports.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Maintenance data:

.1 Submit maintenance and cleaning instructions for acoustical ceiling systems for incorporation into the maintenance manuals.

.3 Maintenance materials:

.1 Deliver for maintenance use, 2% of each type and colour of suspension components and acoustical tiles used in the Work.

.2 Pack panels in suitable containers, clearly dated and identified as to type and location of installation in the Work, and store where directed by City.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers / applicators / erectors:

.1 Installers: Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

.2 Mock-ups:

.1 Construct in locations acceptable to Contract Administrator a typical sample ceiling installation 10 m^2 (108 ft^2) in area, complete with perimeter wall trim. Modify sample as directed and as required to obtain approval. Upon acceptance retain sample as standard of quality for acoustical ceiling.

.2 Do not begin fabrication and erection of remainder of ceiling system until sample installation has been reviewed and accepted. Accepted sample may become a part of the final Work, subject of approval of Contract Administrator.

1.6 Site Conditions

.1 Interior temperature of building shall be between 15°C and 30°C, and relative humidity shall be not more than 70% before and during installation. Maintain uniform temperatures for 72 hours prior to commencement of the work of this section and maintain temperature until completion of the work of this section.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranties:

.1 System:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

.2 Manufacturer's Material warranty for the following:

.1 Acoustical tiles:

.1 Duration: 15 years.

.2 Suspension systems:

.1 Duration: 15 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Single source responsibility:

.1 For each type of acoustical ceiling tile, provide Materials from one manufacturer for the work of this section, including support systems, accessory Materials, and materials.

.1 Where manufacturer does not manufacture or supply required accessory Materials, any such accessory Materials supplied for use in the Work shall have approval from manufacturer for use as part of the final warrantied installation.

.2 Acoustical tile Materials installed as part of the work of this section shall be from same production run.

.2 Design suspension systems for a maximum mid-span deflection not exceeding L/360 in accordance with ASTM C635/C635M-22 deflection test.

.3 Design suspension system to support safely, and without distortion, the superimposed loads of:

.1 Air supply diffusers and return grilles.

.2 Lighting fixtures.

.4 Flame spread: Maximum values in accordance with CAN/ULC-S102-10:

.1 Flame Spread Value (FSV): 25.

.2 Smoke Developed Value (SDV): 50.

2.3 Acoustical Tiles

.1 ACT1:

.1 Classification: Type B, Form B2, Pattern G in accordance with ASTM E1264-23.

.2 Size: Refer to Material Schedule.

.3 Suspension system: Refer to Material Schedule, to suit lights and diffusers as indicated on RCPs.

.4 NRC: minimum 0.90.

.5 Material: Fiberglass.

.6 Edge: Square.

.7 Surface texture: Smooth.

.8 Colour: White.

.9 Acceptable Materials:

.1 CertainTeed ‘Symphony f’ with ‘SmartFit’ panels.

.2 Armstrong ‘Pueblo’.

.3 Substitutions: in accordance with Section 01 25 00.

.2 ACT2; Moisture resistant:

.1 Classification: Type XX, Form A1.2, Pattern E or F in accordance with ASTM E1264-23.

.2 Size: Refer to Material Schedule.

.3 Suspension system: Exterior or wet environment grade, to suit lights and diffusers as indicated on RCPs.

.4 NRC: Refer to Material Schedule.

.5 Material: Wet-formed ceramic and mineral fiber composite.

.6 Surface texture: Medium.

.7 Edge: Square lay-in.

.8 Colour: White.

.9 Acceptable Materials:

.1 Armstrong ‘Ceramaguard Fine Fissured Perforated’.

.2 Substitutions: in accordance with Section 01 25 00.

.3 ACT3:

.1 Classification: Type B, Form B2, Pattern G in accordance with ASTM E1264-23.

.2 Sizes: Refer to Material Schedule.

.3 Suspension system: Standard suspension system, to suit lights and diffusers as indicated on RCPs.

.4 NRC: 0.85 to 0.95.

.5 CAC: 26 to 35.

.6 Material: Fiberglass with foil backing.

.7 Edge: Reveal.

.8 Surface texture: Smooth.

.9 Colour: White.

.10 Acceptable Materials:

.1 CertainTeed ‘Symphony f’ with ‘CAC foil backing’ and ‘SmartFit’ panels.

.2 Armstrong ‘Ultima High NRC’ with tegular edge.

.3 Substitutions: in accordance with Section 01 25 00.

2.4 Metal Suspension Systems

.1 Hanger anchorage devices: Screws, clips, bolts, concrete inserts or other devices applicable to the indicated method of structural anchorage for ceiling hangers and whose suitability for use intended has been proven through standard construction practices or by certified test data. Size devices for 3 x calculated load supported except size direct pull-out concrete inserts for 5 x calculated loads.

.2 Concrete hanger anchors; post installed: Steel eye bolts and nuts to suit ceiling hangers with capability to sustain, without failure, a load equal to 4 times that imposed by ceiling construction, as determined by testing per ASTM E488/E488M-22, conducted by a qualified independent testing laboratory.

.1 Dynabolt Sleeve Anchor 'TW-1614' or Readi-Tie-Drive 'TD4-112' tie wire anchor by ITW Ramset/Red Head.

.2 Kwik-Bolt III 'HHDCA 1/4' tie wire anchor by Hilti Corporation.

.3 Fasteners exposed to weather, condensation, and corrosion: Zinc-plated or stainless steel fasteners in applicable product lines specified in preceding paragraphs.

.3 Hangers and tie wire: Galvanized wire, recommended by manufacturer of suspension system, minimum 2.66 mm (0.1") (12 gauge).

.4 Suspension system accessories:

.1 Splices, clips, and perimeter moulding, of manufacturer's standard type to suit the applicable conditions unless special conditions and access area are shown or specified.

.2 Wall and bulkhead mouldings; hemmed with prefinished exposed flanges and gypsum board taping flange: as recommended by manufacturer. Profiles as indicated.

.1 Acceptable Materials:

.1 ACT1 and ACT2: Armstrong ‘1” Flush T Transition Molding’.

.2 ACT3: Armstrong ‘9/16” Shadow Reveal Transition Molding’.

.3 Substitutions: in accordance with Section 01 25 00.

.5 Standard suspension system, non fire-rated, for ACT1 and ACT3:

.1 Intermediate duty in accordance with ASTM C635/C635M-22, 24 mm (15/16") interlocking tee system, designed to support acoustical panels in patterns indicated with deflection of main tees less than L/360, consisting of main tees and cross tees. The system shall provide lock joint intersections of cross and main tees.

.2 Finish: Enamel paint in colour to match adjacent tile.

.3 Acceptable Materials:

.1 CertainTeed ‘Reveal 15/16” EZ Stab Classic System’.

.2 Armstrong ‘Prelude’.

.3 Substitutions: in accordance with Section 01 25 00.

.6 Exterior or wet environment grade suspension system, for ACT2:

.1 Interlocking tee system in accordance with ASTM C635/C635M-22, designed to support panels in patterns indicated, consisting of main tees and cross tees. System shall be complete with roll formed aluminum double-webbed body and aluminum face with stainless steel clips. The system shall provide lock joint intersections of cross and main tees.

.2 Acceptable Materials:

.1 Armstrong ‘Prelude Plus Aluminum XL 15/16” Exposed Tee’.

.2 Substitutions: in accordance with Section 01 25 00.

2.5 Metal Finish

.1 Metal exposed in finished work shall have a pre-coated baked enamel finish in non-yellowing colour. Submit paint formulation of grid system to lighting fixture, speaker grille, sprinkler and diffuser manufacturers to ensure consistency of colour, sheen and texture of exposed metal components in the ceiling assemblies.

.1 Colour: Flat white.

PART 3- EXECUTION

3.1 Installation - General

.1 Install ceiling panels and metal suspension system in accordance with manufacturer's directions. Where manufacturer's directions are at variance with Contract Documents, notify Contract Administrator before proceeding with installation.

.2 Do not commence installation until work above suspended ceiling has been completed, inspected and accepted.

3.2 Installation - Suspension System

.1 Install suspension system rigid, secure, square, level and plumb, framed and erected to maintain dimensions and contours indicated, and in accordance with ASTM C636/C636M-19, CISCA installation standards and any other applicable national or local code requirements. Make allowance for thermal and structural movement.

.2 Attach hangers to structure with inserts and hanger supports. Do not use powder activated fasteners.

.3 Support hangers for suspended ceiling grid independent of walls, columns, pipes and ducts.

.4 Space hangers for ceilings at maximum 1220 mm (48") on centre in both directions. Provide additional hangers as required to comply with manufacturer's written installation requirements.

.5 Locate hangers at not more than 150 mm (6") from ends of main tee members.

.6 Install exposed tee members to pattern indicated. Securely attach hangers to main tee members.

.7 Exposed tees shall be as long as possible to minimize joints. Make joints square, tight, flush and reinforce with splines. Distribute joints to prevent clustering in one area.

.8 Space tee bars to suit ceiling panels and as detailed, and to accommodate lighting fixtures, diffusers and return grilles.

.9 Cooperate in the installation of ceiling systems, making adjustments where required to ensure that the lighting fixtures, supply diffusers, exhaust grilles and other built-in items properly fit into ceiling module and finish flush with rest of ceiling.

.10 Restrict creep inside module panels so that strips are centred on module lines.

.11 Install edge moulding as detailed where ceiling abuts vertical surfaces. Lap corners, use maximum lengths to minimize joints. Make joints square, tight and flush.

.1 Screw attach mouldings to substrates at intervals not more than 400 mm (16") on centre and not more than 210 mm (8") from ends, levelling with suspension system. Lap corners accurately and connect securely.

3.3 Installation - Tiles

.1 Take precautions during installation to ensure tile edges are not chipped or otherwise damaged.

.2 Minimize field cutting. Rectify cut tile edges of tile to match factory cut edge profile and colour.

.3 Install acoustical tiles to form horizontal and level ceiling with parts flush and joints butted tightly to hairline appearance.

.4 Distribute variations in colour and texture of panels to obtain a uniform appearance.

3.4 Installation - Tolerances

.1 Allowable tolerances: in accordance with ASTM C636/C636M-19.

.2 Install suspension systems level to tolerance of 1:1200.

.3 Install edge mouldings level to tolerance of 3 mm in 3660 mm (1/8" in 12'-0").

3.5 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00 and as follows:

.1 Field tests and inspections:

.1 Independent inspection and testing company shall perform random load tests for ceiling anchor installation.

3.6 Adjusting and Cleaning

.1 Replace uneven, defective or damaged materials and finishes, eliminate waves, remove soiled or stained areas.

.2 Clean dirty and discoloured surfaces of acoustical units and suspension system according to manufacturer's recommendations.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Linear metal ceilings; (ACP3).

1.2 Administrative Requirements

.1 Coordination:

.1 Coordination of work: coordinate layout and installation of acoustic ceiling units and suspension systems components with other work supported by or penetrating through ceilings, including light fixtures, HVAC equipment, partition system and fire suppression system components.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Indicate lay-out, insert and hanger spacing and fastening details and load calculations, splicing method for main and cross runners, location of light fixtures, diffusers, speakers and other penetrations and finishing items, and connection to building components.

.2 Submit reflected ceiling plans.

.4 Samples:

.1 Submit sample of each component of ceiling system. Samples shall fully represent materials to be supplied in colour, texture, finish and construction. Colour shall be submitted as many times as required to match Contract Administrator’s sample.

.2 Submit 450 mm (18") long sample of metal panel in specified finish.

.3 Submit 450 mm (18") long sample of exposed peripheral mouldings and trims in the specified finish.

.4 Submit samples, load test data and design tables for each type of insert to be used in the Work for hanger supports.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

.3 Maintenance materials:

.1 Deliver for maintenance use, 2% of each type and colour of suspension components and panels used in the Work.

.2 Pack panels in suitable containers, clearly dated and identified as to type and location of installation in the Work, and store where directed by City.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

.2 Mock-ups:

.1 Construct in locations acceptable to Contract Administrator a typical sample ceiling installation 10 m^2 (107 ft^2) in area, complete with perimeter wall trim. Modify sample as directed and as required to obtain approval. Upon acceptance retain sample as standard of quality for linear metal ceiling.

.2 Do not begin fabrication and erection of remainder of ceiling system until sample installation has been reviewed and accepted. Accepted sample may become a part of the final Work, subject of approval of Contract Administrator.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Single source responsibility:

.1 For each type of acoustical ceiling panel, provide Materials from one manufacturer for the work of this section, including support systems, and accessory Materials.

.1 Where manufacturer does not manufacture or supply required accessory Materials, any such accessory Materials supplied for use in the Work shall have approval from manufacturer for use as part of the final warrantied installation.

.2 Acoustical panel Materials installed as part of the work of this section shall be from same production run.

.2 Design suspension system to support safely, and without distortion, the superimposed loads of:

.1 Air supply diffusers and return grilles.

.2 Lighting fixtures.

.3 Maximum deflection: L/360 in accordance with ASTM C635/C635M-22 deflection test.

.4 System to be designed and installed to meet Class A requirements for fire performance, with a flame spread index of 25 or less and smoke developed rating of 50 or less when tested in accordance with CAN/ULC-S102-10.

.5 Coordinate installation and cooperate with mechanical and electrical Subcontractors, to accommodate mechanical and electrical items, or any other work required to be incorporated in or coordinated with the ceiling system.

.6 Ceiling panels shall be downward accessible with four torsion springs, minimum, per panel.

2.3 Torsion Spring Metal Ceiling Panels (ACP3)

.1 Fabricate ceiling panels from aluminum sheet with following properties:

.1 Aluminum sheet: in accordance with ASTM B209/B209M-21a, alloy and temper as recommended by aluminum producer for type of use and finish required.

.2 Profile: Formed aluminum with square edges.

.2 Panel size and depth: Refer to Material Schedule.

.3 NRC: 0.70 minimum.

.4 Acceptable Materials: Refer to Material Schedule.

.5 Perforation pattern: Refer to Material Schedule.

.6 Finish: Manufacturer's metallic powder coat finish, custom colour to match exterior cladding.

2.4 Accessories

.1 Wall molding / trim: as indicated on Material Schedule.

.2 Panel end caps and splices: Manufacturer’s standard caps and inserts with finish to match panels.

.3 Access panels: Manufacturer's standard hinged style with retainer clip at locations indicated.

.4 Acoustic fabric/material: Non-woven black glass fibre acoustic backing.

2.5 Metal Suspension Systems

.1 Hanger anchorage devices: Screws, clips, bolts, concrete inserts or other devices applicable to the indicated method of structural anchorage for ceiling hangers and whose suitability for use intended has been proven through standard construction practices or by certified test data. Size devices for 3 x calculated load supported except size direct pull-out concrete inserts for 5 x calculated loads.

.2 Concrete hanger anchors; post installed: Steel eye bolts and nuts to suit ceiling hangers with capability to sustain, without failure, a load equal to 4 times that imposed by ceiling construction, as determined by testing per ASTM E488/E488M-22, conducted by a qualified independent testing laboratory.

.1 Dynabolt Sleeve Anchor 'TW-1614' or Readi-Tie-Drive 'TD4-112' tie wire anchor by ITW Ramset/Red Head.

.2 Kwik-Bolt III 'HHDCA 1/4' tie wire anchor by Hilti Corporation.

.3 Fasteners exposed to weather, condensation, and corrosion: Zinc-plated or stainless steel fasteners in applicable product lines specified in preceding paragraphs.

.3 Hangers: Galvanized wire, recommended by manufacturer of suspension system, minimum 2.66 mm (0.1") (12 gauge).

.4 Twist clips: Provide manufacturer’s standard galvanized steel twist clips to connect carriers to hanger wire.

.5 Suspension system:

.1 Heavy duty in accordance with ASTM C635/C635M-17, 24 mm (15/16") interlocking tee system, designed to support acoustical panels in patterns indicated with deflection of main tees less than L/360, consisting of main tees and cross tees. The system shall provide lock joint intersections of cross and main tees.

.1 Main runners: 38 mm (1-1/2") deep, inverted tee sections, with factory punched flanges to receive torsion spring assembly. Main tee on-centre spacing to match panel length (interior).

.2 Cross runners: 38 mm (1-1/2") deep, inverted tee sections designed to interlock into web of main tee section on designated spacing. Cross tee length to match panel length (interior). Space cross tees 1220 mm (48") on-centre maximum.

.3 Acceptable Materials:

.1 Armstrong ‘Prelude XL’.

.4 Colour: black.

.6 Suspension system accessories: Splices, clips, and perimeter moulding and trim, of manufacturer's standard type to suit the applicable conditions unless special conditions and access area are shown or specified.

PART 3 - EXECUTION

3.1 Installation - General

.1 Do not start installation until exterior glazing has been completed and exterior openings are closed in. Ensure wet work is completed and dried out to a degree acceptable to ceiling panel manufacturer before installation is commenced.

.2 Install ceiling panels and metal suspension system in accordance with manufacturer's directions. Where manufacturer's directions are at variance with Contract Documents, notify Contract Administrator before proceeding with installation.

.3 Do not commence installation until all work above suspended ceiling has been completed, inspected and accepted.

3.2 Installation - Suspension System

.1 Install suspension system rigid, secure, square, level and plumb, framed and erected to maintain dimensions and contours indicated, and in accordance with ASTM C636/C636M-19, CISCA installation standards and any other applicable national or local code requirements. Make allowance for thermal and structural movement.

.2 Attach hangers to structure with inserts and hanger supports. Do not use powder activated fasteners.

.3 Support hangers for suspended ceiling grid independent of walls, columns, pipes and ducts.

.4 Space hangers for ceilings at maximum 1220 mm (48") on centre in both directions. Provide additional hangers as required.

.5 Locate hangers at not more than 150 mm (6") from ends of main tee members.

.6 Erect suspension systems at required heights and water tube, transit, or laser beam level to tolerance of 1:1200.

.7 Level grid to 3.2 mm in 3048 mm (1/8" in 10’) from specified elevation(s), square and true. Allowable tolerances to ASTM C636/C636M-19.

.8 Design suspension systems for a maximum mid-span deflection not exceeding L/360.

.9 Cooperate in the installation of ceiling systems, making adjustments where required to ensure that the lighting fixtures, supply diffusers, exhaust grilles and other built-in items properly fit into ceiling module. Install penetrating items such that penetrating items are supported from structure above, independent of ceiling suspension system.

.10 Restrict creep inside module panels so that in all cases strips are centred on module lines.

.11 Install edge moulding in accordance with manufacturer's requirements and as detailed where ceiling abuts vertical surfaces. Use maximum lengths to minimize joints. Make joints square, tight and flush.

.1 Screw attach mouldings to substrates at intervals not more than 400 mm (16") on centre and not more than 210 mm (8") from ends, levelling with suspension system to tolerance of 3 mm in 3660 mm (1/8" in 12'-0"). Lap corners accurately and connect securely.

3.3 Installation - Ceiling Panels

.1 Install ceiling panels in accordance with manufacturer's written requirements and recommendations.

.2 Install ceiling panels perpendicular to carrier.

.3 Install ceiling panels and trim pieces with neat, tight joints in accordance with reviewed shop drawings.

.4 Scribe and cut panels as necessary to fit at borders and other penetrations in accordance with manufacturer's requirements and recommendations.

3.4 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.1 Independent inspection and testing company shall perform random load tests for ceiling anchor installation.

3.5 Adjusting and Cleaning

.1 Carefully examine suspended ceilings on completion and replace uneven or defective or damaged materials, eliminate all waves, remedy damaged exposed finished surfaces and remove soiled, scratched, or stained areas.

.2 Clean dirty and discoloured surfaces ceiling panels and suspension system according to manufacturer's recommendations.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Linear wood ceilings (acoustic wood ceiling); (ACP2, ACP4).

1.2 Administrative Requirements

.1 Coordination:

.1 Coordination of work: coordinate layout and installation of ceiling units and suspension systems components with other work penetrating through ceilings, including light fixtures, HVAC equipment, partition system and fire suppression system components.

.2 Coordinate with Section 06 40 00 to schedule supply of wood veneer facing so that wood ceiling panels are fabricated in accordance with the construction progress schedule.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Submit engineered shop drawings.

.2 Submit manufacturer's standard details.

.3 Indicate lay-out, insert and hanger spacing and fastening details, splicing method for main and cross runners, location of access splines, and acoustical unit support at ceiling fixture.

.4 Submit reflected ceiling plans for special grid patterns as indicated.

.4 Samples:

.1 Submit sample of each component of ceiling system. Samples shall fully represent materials to be supplied in colour, texture, finish and construction.

.2 Submit samples, load test data and design tables for each type of insert to be used in the Work for hanger supports.

.5 Test reports:

.1 Submit Flame Spread Value (FSV) and Smoke Developed Value (SDV) test results for each wood system as tested by independent inspection and testing agency for project slat panel size, member size, material, and spacing and cross backer assembly.

.6 Acoustic data:

.1 Submit acoustic data verifying that Materials meet specified acoustic design requirements.

.2 Acoustic data submitted shall be from a certified acoustic testing agency.

.7 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

.3 Maintenance materials:

.1 Deliver for maintenance use, 2% of each type and colour of wood ceiling used in the Work.

.2 Pack in suitable containers, clearly dated and identified as to type and location of installation in the Work, and store where directed by City.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

.2 Mock-ups:

.1 Construct in locations acceptable to Contract Administrator a typical sample installation. Modify sample as directed and as required to obtain approval. Upon acceptance retain sample as standard of quality for acoustical ceiling.

.2 Do not begin fabrication and erection of remainder of ceiling system until sample installation has been reviewed and accepted. Accepted sample to become a part of the final Work, subject of approval of Contract Administrator.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Single source responsibility:

.1 For each type of acoustical ceiling panel, provide Materials from one manufacturer for the work of this section, including support systems, and accessory Materials.

.1 Where manufacturer does not manufacture or supply required accessory Materials, any such accessory Materials supplied for use in the Work shall have approval from manufacturer for use as part of the final warrantied installation.

.2 Acoustical panel Materials installed as part of the work of this section shall be from same production run.

.2 Wood grades: Comply with North American Architectural Woodwork Standards 4.0, except as otherwise indicated.

.3 Maximum deflection: 3 mm (1/8") over 2440 mm (8') length.

.4 Coordinate installation and cooperate with mechanical and electrical Subcontractors, to accommodate mechanical and electrical items, or any other work required to be incorporated in or coordinated with the ceiling system.

.5 Mechanical and electrical fixtures shall be independently supported.

.6 Flame Spread Performance:

.1 Unless otherwise indicated materials and assemblies forming part of work of this section shall have flame spread rating of 25 or less in accordance with CAN/ULC-S102-10.

2.3 Linear Wood Ceiling Panel System (ACP2)

.1 Linear wood ceiling panels:

.1 Acoustical performance: NRC 0.65 in accordance with ASTM C423-23.

.2 Plank size and spacing: Refer to Material Schedule.

.3 Assembly style: Wood backed.

.4 Panel sizes: Refer to Material Schedule.

.5 Slats: wood veneer on industrial grade medium density fiberboard. MDF to be manufactured from pre-consumer recycled wood from sustainably managed forests with formaldehyde-free adhesives.

.1 Wood species and finish: Refer to Material Schedule.

.6 Acceptable Materials:

.1 Refer to Material Schedule.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Metal suspension system: Heavy duty 24 mm (15/16") black suspension system as recommended by panel manufacturer, and in accordance with Section 09 51 23.

.1 Provide wall angles, trims and accessories as indicated.

.3 Fabricate removable panels with wood planks aligned to adjacent ceiling system, and to sizes as indicated with additional wood backers to suspend access panels.

.4 Backing fabric: Nonwoven, black, glass fibre matt, 60 g/m² (0.012 psf) surface weight.

.5 Fasteners: as recommended by manufacturer.

2.4 Wood Ceiling Panel System (ACP4)

.1 Perforated tongue and groove wood ceiling panels:

.1 Acoustical performance: NRC 0.70 in accordance with ASTM C423-23.

.2 Panel size: Refer to Material Schedule.

.3 Wood species, stain and finish: Refer to Material Schedule.

.4 Acceptable Materials:

.1 Refer to Material Schedule.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Metal suspension system: Heavy duty 24 mm (15/16") black suspension system as recommended by panel manufacturer, and in accordance with Section 09 51 23.

.1 Provide wall angles, trims and accessories as indicated.

.3 Backing fabric: Nonwoven, black, glass fibre matt, 60 g/m² (0.012 psf) surface weight.

.4 Fasteners: as recommended by manufacturer.

PART 3 - EXECUTION

3.1 Installation

.1 Install suspension system rigid, secure, square, level and plumb, framed and erected to maintain dimensions and contours indicated, and in accordance with ASTM C636/C636M-19, CISCA installation standards and any other applicable national or local code requirements. Make allowance for thermal and structural movement.

.2 Do not start installation until exterior glazing has been completed and exterior openings are closed in. Ensure wet work is completed and dried out to a degree acceptable to Material manufacturer before installation is commenced. Maintain specified environmental conditions for at least 72 hours prior to commencement of the work of this section and maintain temperature until completion of the work of this section.

.3 Do not commence installation until all work above suspended ceiling has been completed, inspected and accepted.

.4 Install metal suspension system in accordance with Section 09 51 23, and in accordance with wood ceiling manufacturer's recommendations.

.5 Install ceiling planks and metal suspension system in accordance with manufacturer's directions. Where manufacturer's directions are at variance with Contract Documents, notify Contract Administrator before proceeding with installation.

.6 Install planks with random end joints and no visible connectors.

.7 Layout linear strips in accordance with reviewed shop drawings and as directed by the Contract Administrator. Frame around openings and maintain true surface planes.

.8 Field cutting shall be kept to a minimum and performed in accordance with the plank manufacturer's recommendations.

3.2 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00 and as follows:

.1 Independent inspection and testing company shall perform random load tests for ceiling anchor installation.

3.3 Adjusting and Cleaning

.1 Carefully examine ceilings on completion and replace uneven or defective materials, eliminate all waves, remedy damaged exposed finished surfaces and remove soiled or stained areas.

.2 Clean dirty and discoloured surfaces according to manufacturer's recommendations.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Tactile attention indicators located at building interiors (TA1).

.2 Tactile attention indicator tiles (TA2).

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company and City shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Submit shop drawings showing placement pattern and installation methods and coordination with work of other sections.

.4 Samples:

.1 Submit full size samples of each type and colour of surfacing.

.5 Test and evaluation reports:

.1 Material data sheets shall include material test reports from qualified independent testing laboratories, current within a 24 month period preceding date of installation, indicating that materials proposed for use in the Work are in compliance with the requirements of the Contract Documents, and meet the properties specified or indicated.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

.3 Maintenance materials:

.1 Deliver 2% of each type of material installed in the Work for maintenance use. Store where directed. Clearly identify each box.

.2 Maintenance materials to be same production run as installed materials.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 3 years' experience, minimum, in application of Materials, systems and assemblies specified.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 5 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Regulatory requirements:

.1 Conform to the building code and Clauses 4.3.5.3.1, 4.3.5.3.3 and 4.3.5.3.4 of CSA B651.

.2 The depth of the tactile attention indicator shall be not less than 600 mm and not more than 650 mm.

.3 Attention pattern:

.1 Truncated domes or cones should be arranged in a square grid.

.2 Height: The height of truncated domes or cones shall be 5 mm +/-1 mm.

.3 Diameter: The top diameter of truncated domes or cones shall range from 12 mm to 15 mm, with the bottom diameter being 10 mm +/- 1 mm greater than the top diameter.

.4 Spacing: Spacing of centers of domes or cones shall be within the following ranges:

Top diameter of truncated domes or cones (mm)	Spacing (mm)
12	55 to 61
15	57 to 63

2.3 Tactile Attention Indicator Stainless Steel Studs (TA1)

.1 Machine finished and forged from one piece of metal with fixed leg for affixing in place into drilled hole. Welded components are not permitted.

.2 Material: Type 316 stainless steel.

.3 Dimensions: Refer to Material Schedule.

.4 Style: Refer to Material Schedule.

.5 Acceptable Material:

.1 Refer to Material Schedule.

.2 Substitutions: in accordance with Section 01 25 00.

2.4 Tactile Attention Indicator Tiles (TA2)

.1 Polymer tile with truncated domes.

.2 Dimensions: Refer to Material Schedule.

.3 Acceptable Material:

.1 Refer to Material Schedule.

.2 Substitutions: in accordance with Section 01 25 00.

.4 Colour: Refer to Material Schedule.

2.5 Accessories

.1 Anchors: as recommended and supplied by tactile attention indicator tile manufacturer for use with tiles being installed.

.2 Adhesive: as recommended and supplied by tactile attention indicator tile manufacturer for use with tiles being installed and suitable for substrates.

.3 Perimeter sealant: as recommended and supplied by tactile attention indicator tile manufacturer for use with tiles being installed.

PART 3 - EXECUTION

3.1 Installation

.1 Install in accordance with manufacturer's written requirements, or authorities having jurisdiction requirements, and in accordance with reviewed shop drawings.

.2 Do not install surfacing over expansion joints or control joints.

3.2 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

3.3 Adjusting and Cleaning

.1 Clean installed exposed surfaces by method recommended by Material manufacturer.

3.4 Protection

.1 Protect installation against damage during construction period in accordance with the tile manufacturer's requirements.

END OF SECTION

PART 1 – GENERAL

1.1 Summary

.1 Section includes:

.1 Vapour barrier membrane.

.2 Wood athletic flooring; (WDFL1, WDFL2).

.3 Floor sockets.

.4 Vent cove wall base.

.5 Game line painting.

.6 Floor finishing.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Clearly indicate materials, finishes, fabrication details, thicknesses, plans, elevations, accessories, court line painting and installation details.

.2 Prepare jointly with Sections 07 18 13, 09 31 00, 09 65 66, and 09 67 00, showing details of transition between floor finish types RSF2, FLC1, EF2 and floor finish type WDFL1; and transition between TL1 and WDFL2.

.4 Samples:

.1 Submit duplicate 300 mm (12") long sample of finish flooring strips and duplicate full size cushions.

.5 Test and evaluation reports:

.1 Submit moisture and alkalinity test results.

.6 Certificates:

.1 Submit MFMA certificate, to accompany wood flooring shipments.

.7 Manufacturers' instructions:

.1 Submit copies of manufacturer's written instructions for each flooring type specified in the project.

.2 Submit details and instructions indicating expansion / contraction controls / allowances of the wood flooring system to suit project and installation service conditions.

.8 Field quality control submittals:

.1 Field condition requirements verification:

.1 Submit written statement to confirm that the manufacturer's environmental requirements have been met prior to commencing installation of wood flooring.

.9 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 10 years' experience, minimum, in application of Materials, systems and assemblies specified and with approval and training of Material manufacturers.

.2 Finishing system shall be performed only by skilled installers who have approval and training of Material manufacturers.

.2 Mock-up:

.1 Submit minimum 3050 mm x 3050 mm (120" x 120") mock-up of floor in location and area as directed by Contract Administrator.

1.6 Site Conditions

.1 Maintain ambient temperature between 18°C and 24°C and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period. Maintain such conditions not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.

.2 Once minimum period of seven days after installation has been passed, maintain relative humidity and ambient temperature planned for building occupants.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 5 years.

1.8 Maintenance

.1 Apply wood floor finishing screen and finish maintenance coat one year after Substantial Performance.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Service conditions:

.1 The building conditions are designed to be maintained between 35% to 50% relative humidity, and within a temperature range of 13°C and 24°C (55°F and 75°F).

.2 Wood floor shall be installed to perform under the above noted conditions without buckling, deterioration of performance qualities (DIN standard).

.3 In-slab relative humidity shall be in accordance with manufacturer's installation requirements.

.2 Dead-load design and construction requirements:

.1 Design and construct wood athletic flooring subfloor to support superimposed loads of parked telescoping bleacher system (in closed position) as indicated in Section 12 66 13 without detrimental performance of wood athletic flooring system.

.3 Floor system to be MFMA PUR compliant and be in accordance with DIN 18032 Part II (1991) and DIN 18032 Part II (2001).

2.3 Wood Athletic Flooring Systems

.1 WDFL1: Robbins 'Bio-Channel Star', anchored resilient.

.2 WDFL2: Robbins ‘UniMax100’, continuously adhered and resilient.

.3 Floor assembly thickness: Refer to Material Schedule.

2.4 Wood Athletic Flooring System

.1 Subfloor:

.1 Plywood: in accordance with CSA O151-17, sheathing grade, load distribution subfloor. OSB not acceptable.

.2 WDFL1 channels: Engineered wood sleepers attached to 15 mm (9/16") continuous "Zero-G" shock pads, EPDM cushion pads factory prepared to accept metal anchor channel.

.3 WDFL2 resilient cushion pads: 15 mm (9/16") continuous "Zero-G" shock pads, EPDM 50-60 durometer.

.2 Wood flooring: MFMA Northern Hard Maple, 20 mm thick x 32 mm wide (25/32” x 1-1/4”) random lengths, T & G and EM, kiln dried, grade marked and stamped as produced by an MFMA member manufacturer.

.1 MFMA-FJ - Second or Better Grade.

.3 Fasteners:

.1 Flooring: 45 mm (1-3/4") fasteners (barbed cleats or staples) or as per manufacturer’s installation requirements.

.2 Subfloor:

.1 WDFL1: 40 mm (1-5/8" to 1-3/4") length nails or staples or as per manufacturer’s installation requirements.

.2 WDFL2: Adhesive as recommended by manufacturer.

.3 Channel anchors: 35 mm (1-1/4") long steel, powder actuated pneumatic anchors or Tapcons as per manufacturer’s installation requirements.

2.5 Accessories

.1 Floor sockets: in accordance with Section 11 66 23.

.1 Coordinate locations with Contract Administrator.

.2 Grout; for floor sockets: Portland cement/sand/water mix to produce 15MPa (2175 PSI) concrete with 75 mm (3") to 100 mm (4") slump.

.2 Vapour barrier: as approved by wood athletic floor system manufacturer.

.1 In accordance with CAN/CGSB 51.34-M86, Type 1, 150 microns (6 mil) polyethylene, complete with sealant at laps.

.3 Vent cove wall base: Type TS, Group 1 in accordance with ASTM F1861-21, back surface grooved with vertical semi-circular 3.9 mm (5/32") radius vents (15 vents per 1.2 m (4 ft. length.

.1 Fasteners: Countersunk, colour matched to screw heads, as recommended by manufacturer.

.2 Dimensions: 100 mm (4") high x 75 mm (3") toe.

.3 Thickness: minimum 6.6 mm (0.26").

.4 Colour: Black.

.5 Provide factory manufactured outside corners.

.6 Acceptable Materials:

.1 Tarkett ‘Johnsonite Vent Cove’.

.2 Substitutions: in accordance with Section 01 25 00.

.4 Threshold plate: Stainless steel, thickness to suit gap as indicated. Fasteners as recommended by installer.

2.6 Wood Finishing System

.1 Oil modified urethane floor finish system:

.1 Floor sealer:

.1 Description:

.1 Oil modified formula to reduce grain raise and prepare the floor for protective floor finish top coat.

.2 Ingredients: Oil modified polyurethane resin, mineral spirits (solvent), driers, defoamers.

.3 Colour: Light amber, clear when dry.

.4 VOC: Does not exceed 350 g/L.

.2 Acceptable Materials:

.1 Bona 'Sport Seal 350’.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Floor finish:

.1 Description:

.1 Oil modified wood floor finish specifically formulated for professional use on maple sports floors, providing a tough, high-build polyurethane finish.

.2 Ingredients: Oil modified polyurethane resin, mineral spirits (solvent), driers, defoamers.

.3 Colour: Light amber, clear when dry.

.4 Gloss level: (60 degrees) 90+.

.5 VOC: Does not exceed 350 g/L.

.2 Acceptable Materials:

.1 Bona 'Sport Poly 350'.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Game line paint:

.1 Acceptable Materials:

.1 Bona ‘Courtlines’.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Colours: to later selection by Contract Administrator from manufacturer’s full range.

PART 3 - EXECUTION

3.1 Examination

.1 Acclimatize materials on site to manufacturer's written requirements.

.2 Verify that site conditions have been provided as requested and specified.

.3 Substrates shall be firm, structurally sound, and dry.

.4 Examine floors in advance of application of flooring to ensure that floors are protected against entry of water and moisture. Perform compatibility test with primer/adhesive and substrate.

.5 Report conditions contrary to requirements preventing proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

.6 Failure to call attention to defects or imperfections will be construed as acceptance and approval of the substrate. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

.7 Defective work resulting from application to unsatisfactory surfaces will be considered the responsibility of those performing the work of this section.

.8 Do not commence installation until work of other sections that may damage the flooring is complete.

3.2 Preparation

.1 Wood flooring conditioning:

.1 Move wood flooring into spaces where it will be installed, no later than seven days prior to installation.

.2 Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.

.3 Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.

.2 Flooring substrates shall be smooth and level within a tolerance of 3 mm (1/8") in a 3 m (10’-0") radius.

.3 Expansion joints, isolation joints, and other movement joints in substrates shall not be filled with patching or levelling compound.

.4 Remove bumps, high spots, peaks and ridges to produce a uniform and smooth substrate.

.5 Sweep and vacuum clean substrates minimum 24 hours prior to alkalinity and moisture, testing. Do not use sweeping compounds.

.6 Notify Contract Administrator of any substrate or levelling compound defects or installation conditions that may result in unsatisfactory performance.

.7 Alkalinity and moisture testing:

.1 Test substrates in accordance with Field Quality Control paragraphs of Section 09 64 66 after preparing subfloor or applying patching and levelling compounds.

.2 Proceed with installation only after substrates pass testing. Document tests performed and submit in writing to Contract Administrator.

.8 Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation. Do not use sweeping compounds.

.9 Flooring supplier to review and confirm in writing that site conditions for preparation are met prior to installation of flooring.

3.3 Installation Wood Athletic Flooring System

.1 Maintain 51 mm (2") expansion space at perimeter of floor surface and at vertical obstructions.

.2 Space joints between flooring strips to allow for intermediate expansion in accordance with local humidity conditions.

.3 Install polyethylene vapour barrier on substrate. Lap joints 150 mm (6") and seal. Turn up 100 mm (4") and seal.

.4 Resilient subfloor system:

.1 WDFL1:

.1 Install wood sleeper channels in accordance with manufacturer's written requirements.

.2 Install solid blocking at doorways, as applicable.

.3 Install plywood subfloor parallel to sleeper channels and fasten in accordance with manufacturer's written requirements.

.2 WDFL2:

.1 Apply adhesive across subfloor in accordance with manufacturer's written requirements. Coordinate installation of

.2 Install solid blocking at doorways, as applicable.

.3 Roll panels with 34 kg (75 lb) roller in accordance with manufacturer's written requirements.

.5 Wood flooring:

.1 Machine nail wood flooring parallel with length of room in accordance with manufacturer's written requirements.

.2 Attach flooring with staples to wood subfloor. Maintain tight joints and board ends. Install to manufacturers written requirements.

.3 Maintain minimum of 100 mm (4") between end joints in adjoining rows of flooring strips.

.4 Install thresholds at openings and where indicated. Attach threshold to adjacent rigid floor surface. Threshold to act as ramp between floor surfaces over expansion space.

.6 Vent cove base installation:

.1 Install base to substrate as scheduled and/or detailed and in accordance with manufacturer's recommendations.

.2 Ensure that substrate is solid and free of voids, gaps, or other defects which will preclude adequate adhesion, or will ghost or telegraph through finished base installation.

.3 Cope mitre corners. Fasten with manufacturer’s recommended adhesive at corners.

.4 Install base in longest lengths possible.

.5 Install straight and level to variation of 1:1000 and free of buckles.

.6 Scribe and fit to door frames and other obstructions.

.7 Joints shall be not less than 610 mm (24") from corners.

.8 Provide joints in base over substrate control joints.

.9 Joints shall be tightly fitted, straight and vertical.

.10 Set base to ensure installation over finished flooring material is free of gaps.

3.4 Wood Floor Finishing

.1 Sand and prepare wood floor to MFMA-accepted methods. Use at least three passes, plus screening.

.2 Apply floor finishing and line painting Materials in accordance with manufacturer’s installation requirements.

.3 For oil modified floor finish system, make final sanding cut to 100 - 120 grit paper. Screen with 100 - 120 grit screen.

.4 Vacuum thoroughly.

.5 For oil modified floor finish system, tack with mineral spirits.

.6 Apply 2 coats floor sealer and screen as specified above.

.7 Sweep, pad, and tack. Allow to dry (at least 30 minutes).

.8 Tape gym lines according to MFMA specifications. Use high quality tape (paint bleed not acceptable). Apply paint evenly with the grain of wood, using brush or 6 mm (1/4") nap roller, 125 microns (5 mils) wet film thickness (enough to come to level of tape). Apply additional coats as required for some colours. Allow paint to dry, a minimum of 24 hours, prior to application of finish.

.1 Markings required: As indicated on drawings.

.9 Abrade line paint with conditioning pad (or a used 120 or 150 screen) before applying finish.

.10 Sweep, pad, and tack. Allow to dry (at least 30 minutes).

.11 Mix finish system components in accordance with manufacturer's written directions. Do not adulterate finish system.

.12 Apply 2 finish coats of floor finish to match approved mock-up, at coverage rate of 12.3-14.7 m^2/L (500-600 ft^2/per gallon).

.13 Allow floor finish to cure thoroughly before permitting traffic (at least 7 days). Abrade floor finish between coats when allowed to cure longer than 48 hours between coats.

.14 Apply floor finishing system to provide a premium quality, smooth and consistent finish free of imperfections, dust or lint particles, and scratches or abrasions.

3.5 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.1 Field tests and inspections:

.1 Moisture and alkalinity:

.1 Test for moisture vapour transmission in accordance with ASTM F710-22 and ASTM F1869-22 or ASTM F2170-19a in accordance with manufacturer’s written flooring installation requirements. Results must not exceed 170 µg/m² (3 lb per 1,000 ft²) in 24 hours when tested to ASTM F1869-22, or exceed 75% when tested to ASTM F2170-19a.

.2 Test for surface pH. Levels of pH shall not exceed the written recommendations of the flooring manufacturer and adhesive manufacturer. Test in accordance with ASTM F710-22.

.3 For each test type: Conduct 3 tests for flooring applications up to 93 m² (1000 ft²) in area, and 1 additional test for each additional 93 m² (1000 ft²) of flooring area.

.2 Manufacturer’s field review to be in accordance with Section 01 45 00.

3.6 Protection

.1 After application, protect floor finish from damage during subsequent work

.2 Prevent traffic to floor finishing materials to printed direction of manufacturer.

.3 Traffic is prohibited on floor finish coats for a period of 48 hours minimum, with only light traffic permitted up to 7 days. Until floor is fully cured (7 days minimum), traffic over floor finish is discouraged, including the application of protection sheets.

.4 Do not use protection materials which will damage floor finish, such as plastic film, rosin paper, non-breathable membranes, and the like, to recommendations of manufacturer.

.5 Do not use cleaning compounds until floor finish is fully cured.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Resilient base; (BS1, BS5).

.2 Resilient floor transition trims.

.3 Resilient stair nosing trims.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Samples:

.1 Selection samples:

.1 Submit manufacturer's range of pattern and colours available for Contract Administrator's selection.

.2 Samples for verification: Submit 3 samples of the following:

.1 305 mm (12") long samples of each colour and type of base material. Include sample of outside corner of base.

.2 100 mm (4") long samples of each colour and type of floor transition trims.

.1 100 mm (4") long samples of each colour and type of stair nosing trims.

.4 Manufacturer's instructions:

.1 Submit manufacturer's installation instructions for Materials proposed for use in the work of this section.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

.3 Maintenance materials:

.1 Provide minimum 2% of each colour, pattern and type of resilient base required for this project.

.2 Maintenance materials to be same production run as installed materials.

.3 Suitably package for protection and storage, each identified with name of manufacturer and material.

.4 Tag and store where directed by City.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

.2 Mock-up:

.1 Resilient base mock-up shall include at least one inside corner, one outside corner plus 20 m (65'-0") of straight run.

.2 Locate at the Site as part of final installation.

.3 Location of installation shall be determined by Contract Administrator.

1.6 Site Conditions

.1 Install materials of this section only when surfaces and air temperatures have been maintained between 21°C and 29.4°C for 7 days preceding installation, and will be so maintained during installation and for 48 hours thereafter. Maintain a minimum temperature of 13°C after above period.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 General

.1 Single source responsibility: Obtain each type of resilient Material from a single source with resources to provide Materials of consistent quality in appearance and physical properties without delaying progress of the Work. Materials installed as part of the work of this section shall be from same production run.

2.3 Resilient Base

.1 Rubber base types (BS1, BS5):

.1 Manufactured from thermoplastic formulation meeting ASTM F1861-21, Type TP, Group 1 (Solid).

.2 Thickness: 3 mm (1/8").

.3 Profile: Cove.

.4 Nominal overall height: Refer to Material Schedule.

.5 Acceptable Materials:

.1 Forbo 'Wall Base', complete with preformed corners.

.2 Substitutions: in accordance with Section 01 25 00.

.6 Colours: Refer to Material Schedule.

2.4 Resilient Floor Transition Trims

.1 Tapered vinyl type to suit site condition for smooth transition. Colour to later selection by Contract Administrator from manufacturer's full range.

.1 Acceptable manufacturer:

.1 Tarkett.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Epoxy to resilient flooring: in accordance with Section 09 65 15.

.3 Carpet to resilient flooring: in accordance with Section 09 68 00.

2.5 Resilient Vinyl Stair Nosing Trims

.1 Flexible vinyl stair nosing in accordance with ASTM F-2169, Type TV, Class 1 and 2, Group 1 and 2.

.2 Dimensions: 44 mm (1-3/4") tread depth and 44 mm (1-3/4") vertical nose.

.3 Colour to later selection by Contract Administrator from manufacturer's full range.

.4 Acceptable Materials:

.1 Tarkett 'DTN-XX'.

.2 Substitutions: in accordance with Section 01 25 00.

.5 Adhesive: Tarkett '946 Premium Contact Adhesive' or as recommended by manufacturer.

2.6 Accessories

.1 Block wall filler: Filler type as recommended by resilient base manufacturer to suit substrate and compatible with materials.

.2 Primers and adhesives: Types as recommended by resilient Material manufacturer compatible with materials and to suit substrate types.

.3 Sealant: Mildew resistant sealant in accordance with Section 07 92 00.

PART 3 - EXECUTION

3.1 Examination

.1 Verify that site conditions have been provided as requested and specified.

.2 Substrates shall be firm, structurally sound, sufficiently porous, and dry.

.3 Examine substrate to ensure clean lines, correct level and freedom from cracks, ridges, dusting, scaling and carbonation.

.4 Examine substrates in advance of application of Materials to ensure that substrates are protected against entry of water and moisture.

.5 Report conditions contrary to requirements preventing proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

.6 Failure to call attention to defects or imperfections will be construed as acceptance and approval of the substrate. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

.7 Defective work resulting from application to unsatisfactory surfaces will be considered the responsibility of those performing the work of this section.

3.2 Preparation

.1 Allow coiled material to lay flat for at least 24 hours at 18°C prior to installation, and maintain this temperature during installation.

.2 Substrates shall be free of deleterious material that may inhibit bond strength or act as a bond breaker. Remove such contaminants and deleterious material using mechanical methods recommended by manufacturer. Do not use chemical abatement methods.

.3 Fill gaps, voids, and cracks, and remove ridges, or other defects which will ghost or telegraph through finished installation.

.4 Expansion joints, isolation joints, and other movement joints in substrates shall not be filled with patching or levelling compound.

.5 Sweep and vacuum clean substrates minimum 24 hours prior to alkalinity, moisture, and adhesion testing. Do not use sweeping compounds.

.6 Notify Contract Administrator of any substrate or levelling compound defects or installation conditions that may result in unsatisfactory performance.

.7 Do not install Materials until they are same temperature as space where they are to be installed.

.8 Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation. Do not use sweeping compounds.

.9 Where flooring adjoins thicker floor materials, apply levelling screed, feather out to make up difference in level between materials.

.10 Spray paints, permanent markers and other indelible ink markers shall not be used to write on the back of the resilient material or used to mark the substrate as they could bleed through and permanently stain the resilient material. If such contaminants are present on the substrate they shall be mechanically removed prior to the installation of the resilient material.

3.3 Installation of Resilient Base

.1 Spread adhesive to ribbed surface (back) of wall base with a 3 mm (1/8") square-notched trowel; allow slight set-up, then bring base into contact with substrate. Ensure full adhesion of base to substrate. Adhesive should cover 80% of back surface. Leave a 6 mm (1/4") uncovered space at the top of the wall base to prevent the adhesive from oozing onto the wall above the base when installed.

.2 Position wall base on wall surface and roll with hand roller. Always roll back to starting point to prevent stretching the wall base.

.3 Set base to ensure installation over finished flooring material is free of gaps.

.4 Install base in longest lengths possible, minimum 2440 mm (8’). Adhere toe of base to substrate, and ensure edge of toe is straight.

.5 Scribe and fit to door frames and other obstructions.

.6 Joints shall be tightly fitted, straight and vertical, and not less than 610 mm (24") from corners.

.7 Provide joints in base over substrate control joints.

.8 Field-made inside corners:

.1 Install wall base to terminate into the corner with a mitre cut.

.2 Position another piece of wall base on opposing wall, without adhesive, approximately 25 mm (1") from the installed piece.

.3 Utilizing the dividers, place the hooked end at the top of the installed piece and the pointer end on the top of the uninstalled piece. Carefully, move the dividers downward in a straight vertical motion, allowing the hooked end of the dividers to follow the profile of the installed piece. At the same time, place adequate pressure on the pointer end to transfer and/or scribe the profile onto the surface of the uninstalled piece.

.4 Use a utility knife to cut the pattern on the uninstalled wall base, apply adhesive, and position the trimmed section into place.

.9 Field-made outside corners:

.1 Install wall base to terminate into the corner with a mitre cut.

.2 Stop application of adhesive to wall base approximately 450 mm (18") from the outside corner of the wall.

.3 Position the wall base at the corner and pencil line the back of the wall base where the bend is desired.

.4 Lay the wall base on the floor with the back up. Utilizing a top-set or pull-type gouge tool, make a shallow notch along the pencil line.

.5 Notch depth should not exceed one-quarter the total thickness of the wall base.

.6 Reposition the wall base corner on the wall. The corner of the wall should fit snugly into the notched recess on the back of the wall base.

.7 Apply adhesive and roll firmly into place.

3.4 Installation Transition Trim

.1 Coordinate transitions with work of other sections and install transition trim to transitions between different flooring types.

.2 Locate thresholds directly beneath the door (in a closed position).

.3 Set to ensure installation is free of gaps.

.4 Install in longest lengths possible.

.5 Scribe and fit to obstructions.

.6 Fit joints tightly, straight and vertical as applicable. Transition trim joints shall be not less than 610 mm (24") from corners.

.7 Mitre corners.

3.5 Installation Stair Nosings

.1 Set to ensure installation is free of gaps.

.2 Install continuous length at each stair length.

.3 Scribe and fit to obstructions.

3.6 Installation Tolerances

.1 Resilient base: Install straight and level to variation of 3 mm (1/8") over 3 m (10’-0”).

.2 Transition trim: Install straight to variation of 3 mm (1/8") over 3 m (10’-0”).

3.7 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.1 Field tests and inspections:

.1 Moisture and alkalinity:

.1 Test for moisture and alkalinity in accordance with Material manufacturer's written requirements.

.2 Testing shall be conducted by independent inspection and testing company and in accordance with Section 01 45 00.

.2 Adhesion bond test:

.1 Proceed with bond test after substrates have been prepared and alkalinity and moisture test have been completed.

.2 Adhesions tests shall be completed in accordance with Material manufacturer's written requirements.

.3 Testing shall be conducted by independent inspection and testing company and in accordance with Section 01 45 00.

3.8 Adjusting and Cleaning

.1 Remove adhesive from surfaces as work progresses in manner described by manufacturer.

.2 Thoroughly clean surfaces in accordance with manufacturer's written requirements.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Rubber sheet flooring; (RFL1).

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Show sheet flooring roll and width layout as related to Contract Administrator’s floor pattern including borders and accents including where flooring materials meet other floor materials.

.2 Show locations of seams, floor drains, floor plates, and where flooring meets other flooring.

.4 Samples:

.1 Selection samples:

.1 Submit manufacturer’s range of pattern and colours available for Contract Administrator’s selection.

.2 Samples for verification:

.1 Flooring: In manufacturer's standard size, but not less than 150 mm (6") x 230 mm (6” x 9”) sections of each different colour and pattern of floor covering required.

.2 Heat-welding bead: Manufacturer's standard-size samples, but not less than 230 mm (9”) long, of each colour required.

.3 Transition trim: Manufacturer’s standard size samples, but not less than 100 mm (4") long, of each colour required.

.4 Seam samples: For each floor covering type, colour, pattern, and seam required, installer shall provide a 150 mm x 230 mm (6” x 9”) sample directly applied to a rigid backing material with the seam running lengthwise and in the center of the sample.

.5 Test and evaluation reports:

.1 Submit test reports from Contractor's moisture, alkalinity, and adhesive bond tests.

.6 Manufacturer's instructions:

.1 Submit manufacturer's installation instructions for Materials proposed for use in the work of this section.

.7 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

.3 Maintenance materials:

.1 Submit width of material x 2% of each colour in full running length, pattern and type flooring material required for this project for maintenance use.

.2 Maintenance materials to be same production run as installed materials.

.3 Suitably package for protection and storage, each identified with name of manufacturer and flooring material.

.4 Tag and store where directed by City.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

.2 Mock-ups:

.1 Prior to commencing flooring installation for this section, prepare full room mock-up (room size at least 10 m^2 (100 ft^2) in area) for acceptance by the Contract Administrator.

.2 Mock-up shall include flooring showing edge treatment and relationships to adjoining surfaces.

.3 Location of installation shall be determined by Contract Administrator.

.4 Do not proceed with flooring specified in this section until mock-up has been accepted by Contractor and Contract Administrator.

1.6 Site Conditions

.1 Install materials of this section only when surfaces and air temperatures have been maintained between 18.4°C and 29.4°C for 48 hours preceding installation, and will be so maintained during installation and for 48 hours thereafter. Maintain a minimum temperature of 13°C after above period. Relative humidity shall be 50 +/- 10%.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Slip resistance: Floors shall have a wet Dynamic Coefficient of Friction (DCOF) of 0.42 or greater in accordance with ANSI A326.3.

.2 Rubber sheet flooring shall not:

.1 Become stained or discoloured due to slab markings.

.2 Delaminate from substrates.

.3 Have welded seams which separate.

2.3 General

.1 Single source responsibility: Obtain each Material from a single source with resources to provide Materials of consistent quality in appearance and physical properties, same production run. Materials installed as part of the work of this section shall be from same production run.

2.4 Rubber Sheet Flooring (RFL1)

.1 In accordance with ASTM F1859-21a, Type I, colours and pattern shall be dispersed throughout the thickness of the wear layer.

.2 Thickness: Refer to Material Schedule.

.3 Acceptable Materials:

.1 Refer to Material Schedule.

.2 Substitutions: in accordance with Section 01 25 00.

.4 Colour: Refer to Material Schedule.

2.5 Miscellaneous Materials

.1 Seam construction:

.1 Hot welded joints: provide welding rod matched to floor pattern/colour selected.

.2 Colours: To later selected by Contract Administrator from full colour range.

.2 Primers and adhesives:

.1 Types as recommended by resilient flooring manufacturer compatible with materials and to suit substrate types and to comply with warranty requirements.

.3 Patching and levelling compound:

.1 Trowel applied Portland cement based, moisture, mildew, and alkali-resistant.

.2 Minimum compressive strength after 28 days shall be minimum 3,500 psi when tested in accordance with ASTM C109 or ASTM C472.

.3 Gypsum based compounds are not acceptable.

.4 Acceptable manufacturers:

.1 Ardex.

.2 Mapei.

.3 Substitutions: in accordance with Section 01 25 00.

.5 Acceptable Material: type as recommended by flooring manufacturer for existing substrate conditions.

.4 Concrete topping (floor levelling build up): in accordance with Section 03 53 00.

.5 Cleaning solution:

.1 Acceptable Materials: type as recommended by flooring manufacturer.

.6 Floor transition strips:

.1 Resilient transition trims:

.1 Tapered vinyl type to suit site condition for smooth transition. Adhesive type to be as recommended by manufacturer.

.2 Resilient flooring to epoxy flooring:

.1 Acceptable Material:

.1 Tarkett ‘SSR-XX-B’, colour to later selection by Contract Administrator from manufacturer’s full range.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Metal transition trim:

.1 Acceptable Material:

.1 Schluter ‘VINPRO-U’, stainless steel E30.

.2 Substitutions: in accordance with Section 01 25 00.

.7 Sealant: Mildew resistant sealant in accordance with Section 07 92 00.

PART 3 - EXECUTION

3.1 Examination

.1 Verify that site conditions have been provided as requested and specified.

.2 Verify that substrates have been provided as specified without holes, protrusions, cracks greater than 1.6 mm (0.06") wide, unfilled control joints, depressions greater than 3 mm (1/8") deep, or other major defects.

.3 Substrates shall be firm, structurally sound, sufficiently porous, and dry.

.4 Examine substrate to ensure clean lines, correct level and freedom from cracks, ridges, dusting, scaling and carbonation.

.5 Examine floors in advance of application of flooring to ensure that floors are protected against entry of water and moisture. Perform compatibility test with primer/adhesive and substrate.

.6 Report conditions contrary to requirements preventing proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

.7 Failure to call attention to defects or imperfections will be construed as acceptance and approval of the substrate. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

.8 Defective work resulting from application to unsatisfactory surfaces will be considered the responsibility of those performing the work of this section.

3.2 Preparation

.1 Comply with recommendations of ASTM F710-22.

.2 Allow Materials to acclimatize in installation area for a minimum 24 hour prior to installation.

.3 Substrates shall be free of wax, oil, silicone, soap, grease, dust, solvents, sealers, curing compounds, hardeners, alkaline salts, excessive carbonation or laitance, mould, mildew, paints, varnish, asphalt, residual adhesives, adhesive removers, or other contaminants or deleterious material that may inhibit bond strength or act as a bond breaker. Remove such contaminants and deleterious material using mechanical methods recommended by manufacturer. Do not use chemical abatement methods.

.4 Concrete substrates that are loose, sandy, scaly, or have a white powdery surface are not acceptable. Substrates shall be mechanically prepared.

.5 Flooring substrates shall be smooth and level within a tolerance of 3 mm (1/8") in a 3 m (10'-0") radius.

.6 Fill surface cracks, holes, score marks, depressions, and grooves, and repair surface spalls with Portland cement patching or levelling compound.

.7 At door opening locations where finished flooring is adjacent to weather-stripping or automatic door bottoms provide trowel-applied levelling compound to provide full contact between finished flooring and weather-stripping or automatic door bottoms. Taper trowel-applied levelling compound to transition with adjacent flooring substrate to provide smooth and seamless transition at maximum slope of 3:1000 (height to distance) ratio.

.8 Expansion joints, isolation joints, and other movement joints in substrates shall not be filled with patching or levelling compound.

.9 Remove bumps, high spots, peaks and ridges to produce a uniform and smooth substrate.

.10 Prepare substrates so that installation of flooring shall not show telegraphing of substrate.

.11 Remove chalking and dusting and loose material from concrete surfaces with wire brushed or by scraping.

.12 Sweep and vacuum clean substrates minimum 24 hours prior to alkalinity, moisture, and adhesion testing. Do not use sweeping compounds.

.13 Notify Contract Administrator of any substrate or levelling compound defects or installation

.14 Prepared concrete substrate shall have a finish equivalent to a magnesium trowel finish. Shiny, slick, non-porous, or overly porous substrates are not acceptable and shall require additional preparation prior to installation of flooring Materials. Prepared concrete substrates shall have a Concrete Surface Profile #3 to #5 in accordance with International Concrete Repair Institute (ICRI).

.15 Alkalinity, moisture, and adhesion testing:

.1 Test substrates in accordance with Field Quality Control paragraphs of Section 09 65 15 after mechanically preparing subfloor or applying patching and levelling compounds.

.2 Proceed with installation only after substrates pass testing. Document tests performed and submit in writing to Contract Administrator.

.16 Do not install floor coverings until they are same temperature as space where they are to be installed.

.1 Move floor coverings and installation materials to acclimatize in spaces where they will be installed at least 48 hours in advance of installation.

.17 Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation. Do not use sweeping compounds.

.18 Where flooring adjoins thicker floor materials, apply levelling screed, feather out to make up difference in level between materials to achieve flush floor finish between adjacent flooring materials unless otherwise indicated.

.19 Spray paints, permanent markers and other indelible ink markers shall not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and permanently stain the flooring material. If such contaminants are present on the substrate they shall be mechanically removed prior to the installation of the flooring material.

3.3 Flooring Installation

.1 Apply adhesive uniformly and install flooring in accordance with flooring manufacturer's requirements. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.2 Allow material to relax unrolled overnight, minimum 12 hours in installation areas.

.3 Install rolls and cuts in sequence following manufacturer’s installation requirements/diagrams.

.1 Lay flooring with joints parallel to building lines to produce symmetrical pattern and minimum joints.

.2 Place seams in inconspicuous and low-traffic areas, at least 150 mm (6") away from parallel joints in levelling underlayment, concrete joints, saw cuts and other type of joints.

.3 Avoid cross seams.

.4 Lay sheet flooring centered in corridors, with equal sized sheet to either side of center sheet.

.5 Mitre intersections at corridors typically. “T” type corridors shall be butt type installation.

.6 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.

.7 Layout seaming uniformly, using full length flooring typically, minimum flooring size of not less than roll width. Limit quantity of less than full length floor pieces at corridors to maximum of 1.

.8 Layout flooring to match reviewed shop drawings floor pattern including borders and accents.

.9 Match edges of floor coverings for colour shading at seams.

.4 Cutting and fitting sheets:

.1 Cut pieces to length allowing approximately 75 mm (3") to 150 mm (6") excess for trimming.

.2 Cut sheet and fit neatly around fixed objects without gaps.

.3 Install one sheet at a time in wet adhesive.

.4 Roll the flooring immediately in both directions using 45 kg (100 lb) three-section roller.

.5 As installation progresses, roll flooring with 75 kg (165 lb) roller to ensure full adhesion, remove adhesive ridges, and entrapped air.

.6 Apply adhesive uniformly and at spreading rates in accordance with adhesive manufacturer's requirements. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.7 Obtain 100% adhesive coverage to flooring backing.

.8 Install flooring to entire area indicated or scheduled, including coverplates occurring within finished floor areas. Maintain overall continuity of colour and pattern with pieces of flooring installed on cover plates. Tightly butt edges to perimeter of floor around cover plates and to cover plates. Cut flooring to floor drains occurring within finished floor

.9 Heat-welded seams:

.1 Weld seams in accordance with ASTM F1516-13(2018).

.2 Wait minimum of 24 hours after flooring installation before grooving and heat welding seams.

.3 Prepare, weld, and trim seams to produce flat surfaces flush with adjoining floor covering surfaces.

.4 Rout joints to approximately 2/3 of the thickness of the material and use welding bead to permanently fuse sections into a seamless floor covering. Groove shall be between 3 mm (0.118") and 3.5 mm (0.138”) wide.

.5 Using a weld plate and skiving knife to make first cut and allow weld rod to fully cure to room temperature.

.6 Using a skiving knife only, finish the trimming of the remainder of the weld. The finish should be smooth and on the same level as the flooring.

.7 Trimming of welded joint while warm is not permitted unless final trimming is performed after weld has cooled to flooring temperature. Excess weld shall be removed using a heated standard putty knife.

.8 Roll the seam area with 45 kg (100 lb) three-section roller.

.9 Maximum variation of welds from plane or from straight: 6 mm (1/4”) in 3 m (10 ft) length using a 3 m (10 ft) straight edge.

.10 Flooring installation shall not show telegraphing of substrate. Flooring installation shall be homogenous free of substrate lines, pockets, bumps and unevenness.

3.4 Installation - Transition Trim

.1 Protect exposed edges of flooring, where finished and unfinished areas adjoining, by means of a transition trim butting to and flush with the finished surface of the flooring covering material and securely adhered to the substrate material.

.2 Coordinate transitions with work of other sections.

.3 Allow coiled vinyl material to lay flat for at least 24 hours at ambient temperatures specified above prior to installation.

.4 Set to ensure installation is free of gaps.

.5 Install in longest lengths possible.

.6 Install straight to maximum allowable variation of 3 mm (1/8") over 3 m (10’-0").

.7 Scribe and fit to obstructions.

.8 Fit joints tightly, straight and vertical as applicable and not less than 610 mm (24") from corners.

.9 Cope mitre corners.

3.5 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00 and as follows:

.1 Field tests and inspections:

.1 Moisture and alkalinity:

.1 Test for moisture vapour transmission in accordance with ASTM F710-22 and ASTM F1869-22 or ASTM F2170-19a in accordance with manufacturer's written flooring installation requirements. Results must not exceed 170 µg/m² (3 lb per 1,000 ft²) in 24 hours when tested to ASTM F1869-22, or exceed 75% when tested to ASTM F2170-19a.

.2 Test for surface pH. Levels of pH shall not exceed the written recommendations of the flooring manufacturer and adhesive manufacturer. Test in accordance with ASTM F710-22.

.3 For each test type: Conduct 3 tests for flooring applications up to 93 m² (1000 ft²) in area, and 1 additional test for each additional 93 m² (1000 ft²) of flooring area.

.4 Testing shall be verified by independent inspection and testing company and in accordance with Section 01 45 00.

.2 Adhesion bond test:

.1 Proceed with bond test after substrates have been prepared and alkalinity and moisture test have been completed.

.2 Select six substrate test areas, each 915 mm (3'-0") x 915 mm (3'-0") in size. Test areas shall be spaced a minimum 1220 mm (48") apart.

.3 Cut 915 mm (3'-0") x 915 mm (3'-0") panels from specified material.

.4 Using the specified adhesive, glue down each panel using adhesive manufacturer's recommended trowel.

.5 After 72 hours, attempt to remove the panels of flooring by pulling up from the corners.

.6 Testing shall be verified by independent inspection and testing company and in accordance with Section 01 45 00.

3.6 Adjusting and Cleaning

.1 Remove excess adhesive from surfaces of the sheet flooring and base as work progresses.

.2 Thoroughly clean surfaces in accordance with manufacturer's recommendations.

3.7 Protection

.1 Prohibit foot traffic on installed flooring for a period of 24 hours after installation. No heavy traffic, rolling loads, or furniture placement are permitted for a minimum of 72 hours after installation.

.2 Protect new floors from time of final set of adhesive until final inspection.

.3 Install floor protection in areas where work, repairs and installation of equipment, and foot traffic will occur.

3.8 Maintenance

.1 Perform initial maintenance in accordance with the manufacturer's written requirements.

.2 Allow flooring to dry prior to applying protection.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Vinyl sheet flooring (RFL2 to RFL7).

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Show sheet flooring roll and width layout as related to Contract Administrator's floor pattern including borders and accents including where flooring materials meet other floor materials.

.2 Show locations of seams, floor drains, floor plates, and where flooring meets other flooring.

.4 Samples:

.1 Selection samples:

.1 Submit manufacturer's range of pattern and colours available for Contract Administrator's selection.

.2 Samples for verification:

.1 Submit sample of vinyl sheet flooring, minimum 150 mm (6") x 150 mm (6") of each different colour and pattern of vinyl sheet flooring.

.2 Submit sample of heat-welding bead, minimum 150 mm (6") length of each colour.

.3 Submit seam samples for each vinyl sheet flooring type and colour with heat-welded seam. Sample shall be a minimum of 150 mm (6") x 254 mm (10") and shall be adhered to a rigid backing material with the seam running lengthwise and in the center of the sample.

.4 Submit sample of fillet support at integral site formed flash cove bases,

.5 Test and evaluation reports:

.1 Submit test reports from Contractor's moisture, alkalinity, and adhesive bond tests.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

.3 Maintenance materials:

.1 Submit width of material x 2% of each colour in full running length, pattern and type flooring material required for this project for maintenance use.

.2 Maintenance materials to be same production run as installed materials.

.3 Suitably package for protection and storage, each identified with name of manufacturer and flooring material.

.4 Tag and store where directed by City.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

.2 Mock-ups:

.1 Prior to commencing flooring installation for this section, prepare full room mock-up (room size at least 10 m^2 (100 ft^2) in area) for acceptance by the Contract Administrator.

.2 Mock-up shall include flooring showing edge treatment and relationships to adjoining surfaces.

.3 Location of installation shall be determined by Contract Administrator.

.4 Do not proceed with flooring specified in this section until mock-up has been accepted by Contractor and Contract Administrator.

1.6 Site Conditions

.1 Install materials of this section only when surfaces and air temperatures have been maintained between 18.4°C and 29.4°C for 48 hours preceding installation, and will be so maintained during installation and for 48 hours thereafter. Maintain a minimum temperature of 13°C after above period. Relative humidity shall be 50 +/- 10%.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Slip resistance: Floors shall have a wet Dynamic Coefficient of Friction (DCOF) of 0.42 or greater in accordance with ANSI A326.3.

.2 Vinyl sheet flooring shall not:

.1 Become stained or discoloured due to slab markings.

.2 Delaminate from substrates.

.3 Have welded seams which separate.

2.3 General

.1 Single source responsibility: Obtain each Material from a single source with resources to provide Materials of consistent quality in appearance and physical properties, same production run. Materials installed as part of the work of this section shall be from same production run.

2.4 Vinyl Sheet Flooring

.1 RFL2, RFL3, RFL4, RFL5, RFL6, RFL7:

.1 Resilient floor covering with wear layer and backing in accordance with ASTM F1303-04(2021).

.2 Thickness: 2 mm (0.08").

.1 Wear layer: minimum 0.7 mm (0.03").

.3 Acceptable Materials:

.1 RFL2: Forbo ‘Eternal Wood’.

.2 RFL3, RFL4, RFL5, RFL6, RFL7: Forbo ‘Eternal Colour’.

.3 Substitutions: in accordance with Section 01 25 00.

.4 Colours: Refer to Material Schedule.

2.5 Miscellaneous Materials

.1 Seam construction:

.1 Hot welded joints, provide welding rod matched to floor pattern/colour selected.

.2 Colours: To later selected by Contract Administrator from manufacturer’s full colour range.

.2 Primer/adhesives:

.1 Types as recommended by resilient flooring manufacturer compatible with materials and to suit substrate types and to comply with warranty requirements.

.2 Adhesives shall be appropriate for equipment, cart, and rolling load traffic where applicable.

.3 Patching and levelling compound:

.1 Trowel applied Portland cement based, moisture, mildew, and alkali-resistant.

.2 Minimum compressive strength after 28 days shall be minimum 3,500 psi when tested in accordance with ASTM C109/C109M-23 or ASTM C472.

.3 Gypsum based compounds are not acceptable.

.4 Acceptable manufacturers:

.1 Ardex.

.2 Mapei.

.3 Substitutions: in accordance with Section 01 25 00.

.5 Acceptable Material: type as recommended by flooring manufacturer.

.4 Cleaning solution:

.1 Acceptable Materials: type as recommended by flooring manufacturer.

.5 Prefabricated flash cove base (BS4):

.1 Acceptable manufacturer:

.1 FlashCove Prefabricated Bases Inc.

.2 Description: 3 m (10’) factory fabricated lengths, with puncture resistant aluminium reinforcing attached through the cove radius, using project specific sheet flooring in run to match specified flooring material and colours.

.3 Riser: 100 mm (4") riser with 75 mm (3") toe.

.4 Cove cap:

.1 Stainless steel “chiklet” cap, adhered in place at time of cove installation. Distributed by FlashCove Prefabricated Bases Inc.

.6 Floor transition strips: in accordance with Section 09 65 15.

.7 Sealant: Mildew resistant sealant in accordance with Section 07 92 00.

PART 3 - EXECUTION

3.1 Examination

.1 Verify that site conditions have been provided as requested and specified.

.2 Verify that substrates have been provided as specified without holes, protrusions, cracks greater than 1.6 mm (0.06") wide, unfilled control joints, depressions greater than 3 mm (1/8") deep, or other major defects.

.3 Substrates shall be firm, structurally sound, sufficiently porous, and dry.

.4 Examine substrate to ensure clean lines, correct level and freedom from cracks, ridges, dusting, scaling and carbonation.

.5 Examine floors in advance of application of flooring to ensure that floors are protected against entry of water and moisture. Perform compatibility test with primer/adhesive and substrate.

.6 Report conditions contrary to requirements preventing proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

.7 Failure to call attention to defects or imperfections will be construed as acceptance and approval of the substrate. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

.8 Defective work resulting from application to unsatisfactory surfaces will be considered the responsibility of those performing the work of this section.

3.2 Preparation

.1 Comply with recommendations of ASTM F710-22.

.2 Allow Materials to acclimatize in installation area for a minimum 24 hour prior to installation.

.3 Substrates shall be free of wax, oil, silicone, soap, grease, dust, solvents, sealers, curing compounds, hardeners, alkaline salts, excessive carbonation or laitance, mould, mildew, paints, varnish, asphalt, residual adhesives, adhesive removers, or other contaminants or deleterious material that may inhibit bond strength or act as a bond breaker. Remove such contaminants and deleterious material using mechanical methods recommended by manufacturer. Do not use chemical abatement methods.

.4 Concrete substrates that are loose, sandy, scaly, or have a white powdery surface are not acceptable. Substrates shall be mechanically prepared.

.5 Flooring substrates shall be smooth and level within a tolerance of 3 mm (1/8") in a 3 m (10’-0") radius.

.6 Fill surface cracks, holes, score marks, depressions, and grooves, and repair surface spalls with Portland cement patching or levelling compound.

.7 At door opening locations where finished flooring is adjacent to weather-stripping or automatic door bottoms provide trowel-applied levelling compound to provide full contact between finished flooring and weather-stripping or automatic door bottoms. Taper trowel-applied levelling compound to transition with adjacent flooring substrate to provide smooth and seamless transition at maximum slope of 3:1000 (height to distance) ratio.

.8 Expansion joints, isolation joints, and other movement joints in substrates shall not be filled with patching or levelling compound.

.9 Remove bumps, high spots, peaks and ridges to produce a uniform and smooth substrate.

.10 Prepare substrates so that installation of flooring shall not show telegraphing of substrate.

.11 Remove chalking and dusting and loose material from concrete surfaces with wire brushed or by scraping.

.12 Sweep and vacuum clean substrates minimum 24 hours prior to alkalinity, moisture, and adhesion testing. Do not use sweeping compounds.

.13 Notify Contract Administrator of any substrate or levelling compound defects or installation conditions that may result in unsatisfactory performance.

.14 Prepared concrete substrate shall have a finish equivalent to a magnesium trowel finish. Shiny, slick, non-porous, or overly porous substrates are not acceptable and shall require additional preparation prior to installation of flooring Materials. Prepared concrete substrates shall have a Concrete Surface Profile #3 to #5 in accordance with International Concrete Repair Institute (ICRI).

.15 Alkalinity, moisture, and adhesion bond testing:

.1 Test substrates in accordance with Field Quality Control paragraphs of Section 09 65 16 after mechanically preparing subfloor or applying patching and levelling compounds.

.2 Proceed with installation only after substrates pass testing. Document tests performed and submit in writing to Contract Administrator.

.16 Do not install floor coverings until they are same temperature as space where they are to be installed.

.1 Move floor coverings and installation materials to acclimatize in spaces where they will be installed at least 48 hours in advance of installation.

.17 Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation. Do not use sweeping compounds.

.18 Where flooring adjoins thicker floor materials, apply levelling screed, feather out to make up difference in level between materials to achieve flush floor finish between adjacent flooring materials unless otherwise indicated.

.19 Spray paints, permanent markers and other indelible ink markers shall not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and permanently stain the flooring material. If such contaminants are present on the substrate they shall be mechanically removed prior to the installation of the flooring material.

3.3 Flooring Installation

.1 Verify Material type, size, thickness, and colour prior to commencing installation. Do not install flooring with visual imperfections, colour variations or apparent defects.

.2 Allow material to relax unrolled overnight, minimum 12 hours in installation areas.

.3 Install rolls and cuts in sequence following manufacturer's installation requirements/diagrams.

.1 Lay flooring with joints parallel to building lines to produce symmetrical pattern and minimum joints.

.2 Place seams in inconspicuous and low-traffic areas, at least 150 mm (6") away from parallel joints in levelling underlayment, concrete joints, saw cuts and other type of joints.

.3 Avoid cross seams.

.4 Lay sheet flooring centered in corridors, with equal sized sheet to either side of center sheet.

.5 Mitre intersections at corridors typically. "T" type corridors shall be butt type installation.

.6 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.

.7 Layout seaming uniformly, using full length flooring typically, minimum flooring size of not less than roll width. Limit quantity of less than full length floor pieces at corridors to maximum of 1.

.8 Layout flooring to match reviewed shop drawings floor pattern including borders and accents.

.9 Match edges of floor coverings for colour shading at seams.

.4 Cutting and fitting sheets:

.1 Cut pieces to length allowing approximately 75 mm (3") to 150 mm (6") excess for trimming.

.2 Remove 12.7 mm (1/2") off the factory seam edge using an edge trimmer or straight edge and knife.

.3 Cut sheet and fit neatly around fixed objects without gaps.

.4 Position remaining sheets so that the top sheet overlaps the previous sheet by 12.7 mm (1/2") to 19 mm (3/4").

.5 Install one sheet at a time in wet adhesive.

.6 Roll the flooring immediately in both directions using 45 kg (100 lb) three-section roller.

.7 After the material has been laid and rolled in wet adhesive, underscribe the seam using the short scribes with a scribed pin right away.

.8 Cut the material along the scribe line using a hooked blade knife and holding it at an angle so to slightly undercut the material.

.9 Roll the seam with a hand roller.

.10 Cross seams:

.1 Straight edge and undercut at an angle the end of the first sheet.

.2 Spread adhesive and lay in wet adhesive.

.3 Roll the flooring immediately in both directions using 45 kg (100 lb) three-section roller.

.4 Overlap the second sheet at butt seam approximately 25 mm (1").

.5 Adhere second sheet except for last 450 mm (18") of butt seam; wait 20 – 30 minutes.

.6 Spread the adhesive for the last 450 mm (18"), lay in material, underscribe the seam to a neat, fit cut, and roll flooring immediately in both directions using 45 kg (100 lb) three-section roller.

.5 Install drain clamping rings.

.6 As installation progresses, roll flooring with 45 kg (100 lb) three-section roller to ensure full adhesion, remove adhesive ridges, and entrapped air.

.7 Where cove base is not required, seal joint at wall with manufacturer’s approved sealant.

.8 Apply adhesive uniformly and at spreading rates in accordance with adhesive manufacturer's requirements. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.9 Obtain 100% adhesive coverage to flooring backing.

.10 Install flooring to entire area indicated or scheduled, including coverplates occurring within finished floor areas. Maintain overall continuity of colour and pattern with pieces of flooring installed on cover plates. Tightly butt edges to perimeter of floor around cover plates and to cover plates. Cut flooring to floor drains occurring within finished floor areas.

.11 Heat-welded seams:

.1 Weld seams in accordance with ASTM F1516-13(2018).

.2 Wait minimum of 24 hours after flooring installation before grooving and heat welding seams.

.3 Prepare, weld, and trim seams to produce flat surfaces flush with adjoining floor covering surfaces.

.4 Rout joints to approximately 2/3 of the thickness of the material and use welding bead to permanently fuse sections into a seamless floor covering. Groove shall be between 3 mm (0.118") and 3.5 mm (0.138”) wide.

.5 Using a weld plate and skiving knife to make first cut and allow weld rod to fully cure to room temperature.

.6 Using a skiving knife only, finish the trimming of the remainder of the weld. The finish should be smooth and on the same level as the flooring.

.7 Trimming of welded joint while warm is not permitted unless final trimming is performed after weld has cooled to flooring temperature. Excess weld shall be removed using a heated standard putty knife.

.8 Roll the seam area with 45 kg (100 lb) three-section roller.

.9 Maximum variation of welds from plane or from straight: 6 mm (1/4”) in 3 m (10 ft) length using a 3 m (10 ft) straight edge.

.12 Flooring installation shall not show telegraphing of substrate. Flooring installation shall be homogenous free of substrate lines, pockets, bumps and unevenness.

3.4 Prefabricated Flash Cove Base Installation

.1 Butt joints to be square cut; inside and outside corners to be mitre cut on site using appropriate power mitre saw. Joints to be seam welded according to manufacturer’s requirements.

.2 Seal ends of cove, where the cove meets a doorframe, walls, and other surfaces with colour matched sealant.

.3 Scribe and fit to door frames and other obstructions.

.4 Joints shall be tightly fitted, straight and vertical, and not less than 610 mm (24") from corners.

.5 Provide joints in base over substrate control joints.

.1 Seal cove cap to wall substrate with sealant bead.

3.5 Installation - Transition Trim

.1 Protect exposed edges of flooring, where finished and unfinished areas adjoining, by means of a transition trim butting to and flush with the finished surface of the flooring covering material and securely adhered to the substrate material.

.2 Coordinate transitions with work of other sections.

.3 Allow coiled vinyl material to lay flat for at least 24 hours at ambient temperatures specified above prior to installation.

.4 Set to ensure installation is free of gaps.

.5 Install in longest lengths possible.

.6 Install straight to maximum allowable variation of 3 mm (1/8") over 3 m (10’-0").

.7 Scribe and fit to obstructions.

.8 Fit joints tightly, straight and vertical as applicable and not less than 610 mm (24") from corners.

.9 Mitre corners.

3.6 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.1 Field tests and inspections:

.1 Moisture and alkalinity:

.1 Test for moisture vapour transmission in accordance with ASTM F710-22 and ASTM F1869-22 or ASTM F2170-19a in accordance with manufacturer’s written flooring installation requirements. Results must not exceed 170 µg/m² (3 lb per 1,000 ft²) in 24 hours when tested to ASTM F1869-22, or exceed 75% when tested to ASTM F2170-19a.

.2 Test for surface pH. Levels of pH shall not exceed the written recommendations of the flooring manufacturer and adhesive manufacturer. Test in accordance with ASTM F710-22.

.3 For each test type: Conduct 3 tests for flooring applications up to 93 m² (1000 ft²) in area, and 1 additional test for each additional 93 m² (1000 ft²) of flooring area.

.2 Adhesion bond test:

.1 Proceed with bond test after substrates have been prepared and alkalinity and moisture test have been completed.

.2 Select six substrate test areas, each 915 mm (3’-0”) x 915 mm (3’-0”) in size. Test areas shall be spaced a minimum 1220 mm (48") apart.

.3 Cut 915 mm (3’-0”) x 915 mm (3’-0”) panels from specified material.

.4 Using the specified adhesive, glue down each panel using adhesive manufacturer’s recommended trowel.

.5 After 72 hours, attempt to remove the panels of flooring by pulling up from the corners.

.6 Testing shall be verified by independent inspection and testing company and in accordance with Section 01 45 00.

3.7 Adjusting and Cleaning

.1 Remove excess adhesive from surfaces of the sheet flooring and base as work progresses.

.2 Thoroughly clean surfaces in accordance with manufacturer’s recommendations.

3.8 Protection

.1 Prohibit foot traffic on installed flooring for a period of 24 hours after installation. No heavy traffic, rolling loads, or furniture placement are permitted for a minimum of 72 hours after installation.

.2 Protect new floors from time of final set of adhesive until final inspection.

.3 Install floor protection in areas where work, repairs and installation of equipment, and foot traffic will occur.

3.9 Maintenance

.1 Perform initial maintenance in accordance with the manufacturer’s written requirements.

.2 Allow flooring to dry prior to applying protection.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Resilient weight room flooring; (RSF1).

.2 Resilient track flooring; (RSF2).

.3 Resilient weight room flooring for heavy weights area; (RSF3).

.4 Rubber playground tiles; (RFL8, RFL9).

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Show track lines at RSF2.

.4 Samples:

.1 Submit 3 – 300 mm x 300 mm (12" x 12") sample of each type, pattern, and colour of flooring specified.

.5 Test and evaluation reports:

.1 Submit test reports from Contractor’s moisture, alkalinity, and adhesive bond tests.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer’s operation and maintenance instructions for inclusion in the operation and maintenance manuals.

.3 Maintenance materials:

.1 Deliver 2% of each color, pattern and type flooring material required for this project for maintenance use. Store where directed. Clearly identify each box.

.2 Maintenance materials to be same production run as installed materials.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

.2 Mock-up:

.1 Prior to proceeding with permanent installation, prepare a mock-up installation for review indicating method of each type of application, edge treatment and relationships to adjoining surfaces. Minimum area shall be 15°m^2 (161°ft^2).

.2 Location of installation shall be determined by Contract Administrator.

1.6 Site Conditions

.1 Install materials of this section only when surfaces and air temperatures have been maintained between 18°C and 32°C for 48 hours preceding installation, and will be so maintained during installation and for 48 hours thereafter. Maintain a minimum temperature of 13°C after above period.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 RSF1: Recycled rubber fitness centre tile flooring with hidden connections to fasten tiles.

.1 Tile size and thickness: Refer to Material Schedule.

.2 Acceptable Materials:

.1 Refer to Material Schedule.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Colour: to later selection by Contract Administrator from manufacturer's standard range.

.4 Provide reducer transition trim as required.

.2 RSF2: Prefabricated track flooring, composed of a rubber wear layer vulcanized to a rubber backing layer.

.1 Thickness: Refer to Material Schedule.

.2 Acceptable Materials:

.1 Refer to Material Schedule.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Colour: Refer to Material Schedule.

.4 Line paint: Pigmented two-component polyurethane paint as recommended by track flooring manufacturer.

.1 Colour: Refer to Material Schedule.

.3 RSF3: Recycled rubber fitness centre tile flooring with hidden connections to fasten tiles.

.1 Tile size and thickness: Refer to Material Schedule.

.2 Acceptable Materials:

.1 Refer to Material Schedule.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Colour: Refer to Material Schedule.

.4 Provide reducer transition strip trim as required.

.4 RFL8, RFL9: Recycled rubber playground tile suitable for a fall height of 915 mm (36").

.1 Impact attenuation: in accordance with ASTM F1292-18:

.1 HIC: <700.

.2 G-MAX: <125.

.2 Tile size and thickness: Refer to Material Schedule.

.3 Acceptable Materials:

.1 Refer to Material Schedule.

.2 Substitutions: in accordance with Section 01 25 00.

.4 Colours: Refer to Material Schedule.

.5 Transition trim:

.1 Material: to match rubber tiles.

.2 Acceptable Materials:

.1 SofSurfaces ‘DuraSAFE sofRAMP ADA’.

.2 Substitutions: in accordance with Section 01 25 00.

.5 Primers and adhesives: Type as recommended by flooring manufacturer compatible with materials and to suit substrate.

.6 Patching and levelling compound:

.1 Trowel applied Portland cement based, moisture, mildew, and alkali-resistant.

.2 Minimum compressive strength after 28 days shall be minimum 3,500 psi when tested in accordance with ASTM C109/C109M-23 or ASTM C472.

.3 Gypsum based compounds are not acceptable.

.4 Acceptable manufacturers:

.1 Mapei.

.2 Ardex.

.3 Substitutions: in accordance with Section 01 25 00.

.5 Acceptable Material:

.1 Type as recommended by flooring manufacturer to suit substrate conditions and compatible with flooring adhesive and primers.

.7 Reducing strips; as required between adjacent flooring finishes: to suit site condition for smooth transition.

.8 Floor transition strips:

.1 Fitness flooring to running track: Schluter ‘Schiene’.

PART 3- EXECUTION

3.1 Examination

.1 Examine substrate to ensure clean lines, correct level and freedom from cracks, ridges, dusting, scaling and carbonation.

.2 Examine floors in advance of application of flooring to ensure that floors are protected against entry of water and moisture. Perform compatibility test with primer/adhesive and substrate.

.3 Before beginning installation, verify with flooring manufacturer that substrate is properly cured, clean and dry.

.4 Verify with Contractor, and by visual inspection that no curing compounds and /or sealers have been applied to the concrete without prior approval of the flooring manufacturer/supplier.

3.2 Preparation

.1 Allow Materials to acclimatize in installation area for a minimum 24 hour prior to installation.

.2 Verify floor surfaces are smooth, clean and cured, with trowel finish, free from curing compounds or surface coatings, in accordance with flooring manufacturer's written installation requirements.

.3 Remove adhesives, coatings, dirt and foreign matter, excessive dusting, broken or loose concrete, and moisture which would impair bond.

.4 Substrate to be prepared in accordance with ASTM F710-22.

.5 Alkalinity and moisture testing:

.1 Test substrates in accordance with Field Quality Control paragraphs of Section 09 65 66 after mechanically preparing subfloor or applying patching and levelling compounds.

.2 Proceed with installation only after substrates pass testing. Document tests performed and submit in writing to Contract Administrator.

.6 Fill cracks, grooves, voids and /or construction joints with levelling compound as approved by manufacturer. High spots on the floor shall be removed by grinding them down.

3.3 Flooring Installation - Roll Rubber Flooring

.1 Install flooring in accordance with manufacturer's written installation requirements.

.2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's written requirements. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.3 Lay flooring with joints parallel to building lines to produce symmetrical pattern. Borders minimum half roll width.

.4 Trim and fit neatly around fixed objects.

.5 Remove any excessive adhesive from surfaces of flooring as work progresses.

.6 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar, unless otherwise indicated.

.7 Apply game lines in accordance with manufacturer's installation requirements in design and colours as indicated.

.8 Protect laid flooring from construction traffic for a period as recommended by manufacturer. At the end of this time, thoroughly clean all surfaces with a neutral cleaner as approved by manufacturer of flooring materials.

.9 Protect floors from time of final set of adhesive until final inspection. Install suitable protection sheeting, lap joints of material by 150 mm (6") and seal with non-asphaltic tape.

.10 Install floor protection in areas where work of other sections, repairs and installation of equipment, and foot traffic will occur.

3.4 Installation - Interlocking Resilient Tile Flooring

.1 Install dry laid interlocking resilient tiles in accordance with flooring manufacturer's written specifications.

.2 Inspect tiles for any damages or defects.

.3 Review installation layout and verify measurements of installation area.

.4 Center/square and chalk area to receive tile flooring.

.5 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles shall be minimum half tile width.

.6 Proceed to place tiles, by engaging male and female interlocking tile connections, in an ashlar or point-to-point pattern and in accordance with approved mock-up. Work from centre of room outwards to achieve a solid connection between tiles.

.7 Maintain continuity of colour and pattern.

.8 Use a hand roller, rubber hammer or a piece of wood covered with a thick cloth, in order to complete the entire installation.

.9 Lay main field tiles 24 to 48 hours prior to cutting perimeter tiles and allow tiles to acclimatise.

.10 At tile flooring perimeter, allow perimeter expansion gap of between 0.5% to 1% of room dimensions or as recommended by flooring manufacturer.

.11 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.

3.5 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.1 Field tests and inspections:

.1 Moisture and alkalinity:

.1 Test for moisture vapour transmission in accordance with ASTM F710-22 and ASTM F1869-22 or ASTM F2170-19a in accordance with manufacturer's written flooring installation requirements. Results must not exceed 170°µg/m^2 (3°pounds per 1,000°square feet) in 24 hours when tested to ASTM F1869-22, or exceed 75% when tested to ASTM F2170-19a.

.2 Test for surface pH. Levels of pH shall not exceed the written recommendations of the flooring manufacturer and adhesive manufacturer. Test in accordance with ASTM F710-22.

.3 For each test type: Conduct 3 tests for flooring applications up to 93°m^2 (1000°square feet) in area, and 1 additional test for each additional 93°m^2 (1000°square feet) of flooring area.

.4 Testing shall be verified by independent inspection and testing company and in accordance with Section 01 45 00.

3.6 Protection

.1 Protect exposed edges of resilient flooring, where finished and unfinished areas adjoin, by means of a reducing strip butting to and flush with the finished surface of the flooring covering material and securely adhered to the substrate material.

.2 Install reducing strips where flooring terminates. Set flush with adjacent floor finishes.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Fluid-applied epoxy flooring; (EF1, EF2).

1.2 Administrative Requirements

.1 Coordination:

.1 Advise other trades of fixtures and fittings not to be installed until floor coating materials are cured, such as: radiators, painting, decorating, floor-supported equipment or cabinetwork, caulking, plumbing, fixtures, and the like.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Submit shop drawings showing proposed divider strips and start / stop installation lines. Coordinate locations with slab control joints. Lay out divider strips symmetrically in rooms.

.4 Samples:

.1 Submit 305 mm x 305 mm (12" x 12") samples of each specified material, in each specified colour to show successive applications of each coat for Contract Administrator’s approval.

.2 Submit 305 mm x 305 mm (12" x 12") sample of completed system on rigid backing, demonstrating texture and broadcast aggregate, colour, and sheen, for Contract Administrator’s approval.

.5 Manufacturers’ instructions:

.1 Submit substrate preparation guidelines, installation instructions, and general recommendations.

.6 Submit for approval a list of the floor coating materials intended for use in the Work for each substrate condition before installation commences.

.7 Include sample of warranty customized for this Project.

.8 Submit list of recent projects completed by installation crew(s) proposed for work of this section available for viewing by Contract Administrator and independent inspection and testing company.

.9 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

1.5 Quality Assurance

.1 Qualifications:

.1 Manufacturers:

.1 Company specializing in manufacturing the Materials specified in this section, with 10 years' experience, minimum.

.2 Installers / applicators / erectors:

.1 Applicators: Shall have 5 years' experience, minimum, in application of Materials and systems specified and with approval and training of Material manufacturers.

.2 Subcontractor must be approved by the flooring system manufacturer.

.2 Mock-ups:

.1 Provide mock-up panel 5 m² (53.8 ft²) minimum area, of coating system at the Site as part of final installation for approval by Contract Administrator and City, location to be determined by Contract Administrator. Mock-up will serve as a benchmark for installation of the system for the Work.

1.6 Site Conditions

.1 Unless required otherwise by manufacturer's installation requirements, maintain ambient temperature of not less than 13°C and not more than 32°C, and a floor temperature of not less than 16°C from 24 hours before installation to at least 72 hours after installation. Maintain relative humidity of not higher than 80% during same period.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Material compatibility: Provide materials that are compatible with one another under conditions of service and application required, as demonstrated by manufacturer based on testing and field experience.

.2 Slip resistance: Floors shall have a wet Dynamic Coefficient of Friction (DCOF) of 0.42 or greater in accordance with ANSI A326.3.

.3 Floors coatings shall not show spalling, cracking, or delamination.

2.3 General

.1 Installation of systems specified in this section to be by a single Subcontractor.

.2 Materials shall be sourced from one manufacturer unless otherwise specified.

2.4 Self-Levelling Floor Screed

.1 Cementitious self-levelling floor screed compatible with epoxy flooring, as recommended by manufacturer:

.1 Acceptable Materials:

.1 Sika 'Sikafloor Level-25'.

.2 Sika 'SikaScreed 40'.

.3 Substitutions: in accordance with Section 01 25 00.

2.5 Epoxy Coating (EF1, EF2)

.1 Multi-layered epoxy floor system with non-slip finish.

.1 Thickness: minimum 3 mm (1/8”).

.2 Basis of design: Mapei ‘Mapefloor System 32’.

.1 Primer: Mapei ‘Primer SN’.

.2 Intermediate and top coats: Mapei ‘Mapefloor I 302 SL’.

.3 Colours and finishes:

.1 EF1: custom, to later selection by Contract Administrator.

.2 EF2: custom, to later selection by Contract Administrator.

.4 Texture: non-reactive and oven-dried aggregate, or as per manufacturer’s recommendations.

.2 Transition trims:

.1 TR25; Running track to epoxy: ‘L’ shape zinc x depth of coating.

PART 3 - EXECUTION

3.1 Examination

.1 Verify that specified site conditions exist before commencing the work of this section.

.2 Examine surfaces to receive floor and wall coatings. Surfaces shall be smooth, sound, dry, and free from conditions that will adversely affect execution, permanence, or quality of work.

.3 Verify that surfaces to receive coatings can be put into acceptable condition by means of preparation specified in this section.

.4 Floor surfaces to receive coating shall be equivalent to a light steel trowel finish for new or patched concrete surface.

.5 Examine floor surfaces to be coated for slope to drain irregularities which could create non-sloping or ponding conditions on the epoxy coating surface.

.6 Verify that floor drains are installed flush with top of floor slabs.

.7 Commencement of installation implies acceptance of surfaces as suitable to receive coating system.

3.2 Preparation

.1 After acceptance of surfaces, prepare them as required to receive the work of this section. Remove projections and other conditions that may affect the installation of the flooring system.

.2 Concrete slabs shall have sound surface free of dust, chemicals, grease, oil, laitance and curing agents.

.3 Remove curing compounds, surface hardeners, existing flooring adhesives, and epoxy flooring coatings in accordance with manufacturer's written recommendations.

.4 Fill open control joints, and other cracks and voids with sealant material compatible with floor coating materials.

.5 Remove projections and other conditions which may affect installation of the coating.

.6 Repair surface spalls and imperfections with patching compound approved by manufacturer.

.7 Prepare concrete surfaces by mechanical method of steel shotblast, sandblast, or other method approved by coating manufacturer in accordance with International Concrete Repair Institute (ICRI) recommendations to achieve a CSP 3 profile. Thoroughly vacuum clean floors upon completion of blast operation. Substrate to be approved in writing by manufacturer prior to application of coating.

.1 Submit written report to Contract Administrator following procedures for manufacturer's field review in accordance with Section 01 45 00.

.8 Alkalinity and moisture testing:

.1 Test substrates in accordance with Field Quality Control paragraphs of Section 09 67 00 after mechanically preparing subfloor or applying patching and levelling compounds.

.2 Proceed with installation only after substrates pass testing. Document tests performed and submit in writing to Contract Administrator.

.9 Cover or mask surfaces adjacent to those receiving coating to protect work of others and property from damage and soil.

3.3 Installation

.1 General:

.1 Apply coatings with care to ensure that no laps, voids, or other marks or irregularities are visible, and with an appearance of uniform colour, sheen and texture, all within limitations of materials and areas concerned.

.2 Match colours and textures of approved samples.

.3 Make clean true junctions with no visible overlap between adjoining applications of coatings.

.4 Install flooring to entire area indicated or scheduled, including coverplates occurring within finished floor areas. Maintain overall continuity of colour and pattern with pieces of flooring installed on cover plates. Tightly butt edges to perimeter of floor around cover plates and to cover plates. Do not install flooring to floor drains occurring within finished floor areas.

.5 Place cloths and other disposable coating materials, that are a fire hazard, in closed metal containers and remove from building every night.

.6 Verify that spark-proof electrical equipment is used in area where inflammable materials are being applied.

.7 Erect barriers to prevent the entry and presence of personnel not performing work of this section during application of coatings, and for 48 hours following completion of application.

.8 Apply coating system in compliance with coating manufacturer's directions to produce a pinhole free surface that also provides a positive slope to drains in flooring system.

.9 Apply coatings in continuous manner, starting and stopping in straight lines centre at doorways or other building lines; haphazard installation continuation lines will not be permitted.

.2 Application; flooring system:

.1 Terminate flooring in straight lines at centreline of door in openings where adjacent floor finish or colour is dissimilar.

.2 Trowelled or broadcast installation shall not show telegraphing of substrate or trowel or toolmarks.

.3 Trowelled or broadcast installation shall be homogenous free of substrate lines, pockets, bumps and unevenness greater than 1.5 mm (1/16”) in 300 mm (12"), not including texture.

.4 Prime coat: mix components and apply primer over prepared substrate at manufacturer's recommended spreading rate, with timing of application coordinated with subsequent application of topping mix to ensure optimum adhesion between flooring materials and substrate.

.5 Body coat: mix components and trowel apply body coats over tacky primer at spreading rates as recommended by manufacturer. Broadcast aggregate into wet body coat. Build up flooring system as required to provide positive slope to drains.

.6 Clean surface prior to application of finish coat for approval by Contract Administrator.

.7 Finish coats: Squeegee apply finish coats over tacky primer at spreading rates as recommended by manufacturer.

.8 Provide zinc termination strips, of appropriate thickness and where flooring system meets different flooring types.

.3 Use saw cut and chip method at termination locations unless otherwise indicated.

.4 Joints: Where substrate is interrupted by expansion or control joints, provide joint in coating system to comply with details indicated, of if not indicated, as recommended by coating system manufacturer. Fill joints with specified compounds.

.5 Match approved samples in sheen, colour and texture.

3.4 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00

.1 Field tests and inspections:

.1 Moisture and alkalinity:

.1 Test for moisture vapour transmission in accordance with ASTM F1869-22 in accordance with manufacturer’s written installation requirements. Maximum percentage of moisture acceptable is 1.8 kg/93 m^2 (4 lb/1000 ft^2) in a 24 hour period, unless otherwise specified by manufacturer’s printed literature.

.2 Test for surface pH. Levels of pH shall not exceed the written recommendations of the flooring manufacturer and adhesive manufacturer. Test in accordance with ASTM F710-22.

.3 For each test type: Perform 3 tests for flooring applications less than 186 m^2 (2000 square feet) in area, and 1 test per additional 93 m^2 (1000 square feet).

.4 Testing shall be by independent inspection and testing company and in accordance with Section 01 45 00.

.2 Coating thickness:

.1 Verify to Tooke thickness gauge, and in the presence of Contract Administrator and manufacturer's representative, that thicknesses of completed coatings meet specified requirements.

.2 Perform cut through/coring tests where selected by Contract Administrator 1 per 93 m^2 (1000 ft^2) in finished areas to determine thicknesses and finishes of epoxy coatings.

.3 Contractor shall repair areas as a result of inspection and testing work.

.2 Manufacturer’s field review to be in accordance with Section 01 45 00.

3.5 Adjusting and Cleaning

.1 Touch up and refinish minor defective work. Refinish entire coated surface areas where finish is damaged or otherwise unacceptable.

.2 Remove promptly as work progresses spilled or spattered coating materials from surfaces of work performed under other sections. Clean surfaces on completion of work. Do not mar surfaces while removing.

.3 Leave storage and mixing areas in same condition as equivalent spaces in project. Clean flooring just prior to final acceptance using materials and procedures recommended by flooring manufacturer.

.4 Final cleaning is specified in Section 01 74 00.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Carpet tile; (CPT1).

1.2 Administrative Requirements

.1 Coordination:

.1 Coordinate transitions with work of other sections and install transition trim to transitions between carpet flooring and adjacent flooring.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Carpet tile layout drawings: Submit for review drawings of tile layout pattern, location and type of accessories.

.4 Samples:

.1 Submit 3 samples of each type and colour of carpet.

.2 Minimum sample sizes:

.1 Carpet tile: Full size tile.

.3 Submit 150 mm (6") length sample of floor edge trim.

.5 Test and evaluation reports:

.1 Submit test reports from Contractor’s moisture, alkalinity, and adhesive bond tests.

.6 Manufacturers’ instructions:

.1 Submit carpet and adhesive manufacturer's written installation recommendations for each type of substrate required.

.2 Identify trowel notch size and shape, and required adhesive coverage rates for each specified carpet material for installation of specified materials.

.7 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

.3 Maintenance materials:

.1 Carpet tile: 2% of each carpet colour and type specified, supplied in full size units.

.2 Maintenance materials to be same production run as installed materials.

.3 Suitably package for protection and storage, each identified with name of manufacturer and flooring material.

.4 Tag and store where directed by City.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers: Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

.2 Mock-ups:

.1 Prior to commencing flooring installation for this section, prepare full room mock-up (room size at least 10 m^2 (100 ft^2) in area) for acceptance by the Contract Administrator and City.

.2 Mock-up shall include floorings showing edge treatment and relationships to adjoining surfaces.

.3 Location of installation shall be determined by Contract Administrator.

.4 Do not proceed with flooring specified in this section until mock-up has been accepted by Contractor and Contract Administrator.

1.6 Site Conditions

.1 Ambient temperature and humidity shall comply with CRI Carpet Installation Standard 2015.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 System:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

.2 Manufacturer's warranty: Manufacturer's standard materials-only warranty in which manufacturer agrees to furnish replacement materials for defects attributable to materials within specified warranty period. Defects include the following:

.1 Static electricity, no more than 3.0 KV per AATCC 134-2019.

.2 Delamination.

.3 Edge Ravel.

.4 Zippering.

.5 Duration: 10 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 General

.1 Single source responsibility: Obtain each Material from a single source with resources to provide Materials of consistent quality in appearance and physical properties, same production run, without delaying progress of the Work. Materials installed as part of the work of this section shall be from same production run.

2.3 Carpet Tile (CPT)

.1 Acceptable manufacturers:

.1 Interface.

.2 Venture.

.3 Beaulieu.

.2 Carpet tile types:

.1 CPT1: refer to Material Schedule.

.2 Backing: PVC free.

.1 Basis of design: Interface ‘CQuestBio’.

2.4 Miscellaneous Materials

.1 Primers and adhesives: Type as recommended by carpet manufacturer compatible with materials and to suit substrate types and to comply with warranty requirements.

.1 Carpet tile: Pressure sensitive type.

.2 Transition trim adhesive: Type as recommended by transition trim manufacturer compatible with materials and to suit substrate types.

.2 Patching and levelling compound:

.1 Type as recommended by flooring manufacturer compatible with materials and to suit substrate types and to comply with warranty requirements.

.2 Trowel applied Portland cement based, moisture, mildew, and alkali-resistant.

.3 Minimum compressive strength after 28 days shall be minimum 3,500 psi when tested in accordance with ASTM C109/C109M-23.

.4 Gypsum based compounds are not acceptable.

.5 Acceptable manufacturers:

.1 Ardex.

.2 Mapei.

.3 Substitutions: in accordance with Section 01 25 00.

.3 Concrete topping (floor levelling build up): in accordance with Section 03 53 00.

.4 Floor transition strips:

.1 Carpet to resilient flooring: to later selection by Contract Administrator.

.2 Tile to carpet: Refer to Section 09 31 00.

.3 Resilient transition trims:

.1 Tapered vinyl type as manufactured by Johnsonite to suit site condition for smooth transition. Colour to later selection by Contract Administrator from manufacturer’s full range. Adhesive type to be as recommended by manufacturer.

.1 Substitutions: in accordance with Section 01 25 00.

.4 Metal transition trim:

.1 Acceptable Material:

.1 Schluter ‘VINPRO-S’, aluminum, finish to later selection by Contract Administrator.

.2 Substitutions: in accordance with Section 01 25 00.

PART 3 - EXECUTION

3.1 Examination

.1 Ensure that site conditions have been provided as requested and specified.

.2 Ensure that substrates have been provided as specified without holes, protrusions, cracks or unfilled control joints or depressions that would telegraph in finished carpet installation.

.3 Substrates shall be firm, structurally sound, sufficiently porous, and dry.

.4 Examine substrate to ensure clean lines, correct level and freedom from cracks, ridges, dusting, scaling and carbonation.

.5 Examine floors in advance of application of flooring to ensure that floors are protected against entry of water and moisture.

.6 Report conditions contrary to requirements preventing proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

.7 Failure to call attention to defects or imperfections will be construed as acceptance and approval of the substrate. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

.8 Defective work resulting from application to unsatisfactory surfaces will be considered the responsibility of those performing the work of this section.

3.2 Preparation

.1 Comply with recommendations of ASTM F710-22.

.2 Unroll and allow carpet to relax in the installation area for a minimum of 24 hours at a temperature between 18-35°C.

.3 Substrates shall be free of wax, oil, silicone, soap, grease, dust, solvents, sealers, curing compounds, hardeners, alkaline salts, excessive carbonation or laitance, mould, mildew, paints, varnish, asphalt, residual adhesives, adhesive removers, or other contaminants or deleterious material that may inhibit bond strength or act as a bond breaker. Remove such contaminants and deleterious material using mechanical methods recommended by manufacturer. Do not use chemical abatement methods.

.4 Flooring substrates shall be smooth and level within a tolerance of 3 mm (1/8”) in a 3 m (10’-0”) radius.

.5 Concrete substrates that are loose, sandy, scaly, or have a white powdery surface are not acceptable. Substrates shall be mechanically prepared.

.6 Fill surface cracks, holes, score marks, depressions, and grooves, and repair surface spalls with Portland cement patching or levelling compound.

.7 Expansion joints, isolation joints, and other movement joints in substrates shall not be filled with patching or levelling compound.

.8 Remove bumps, high spots, peaks and ridges to produce a uniform and smooth substrate.

.9 Prepare substrates so that installation of flooring shall not show telegraphing of substrate.

.10 Remove chalking and dusting and loose material from concrete surfaces with wire brushed or by scraping.

.11 Sweep and vacuum clean substrates minimum 24 hours prior to alkalinity, moisture, and adhesion testing. Do not use sweeping compounds.

.12 Notify Contract Administrator of any substrate or levelling compound defects or installation conditions that may result in unsatisfactory performance.

.13 Alkalinity, moisture, and adhesion testing:

.1 Test substrates in accordance with Field Quality Control paragraphs of Section 09 68 00 after mechanically preparing subfloor or applying patching and levelling compounds.

.2 Proceed with installation only after substrates pass testing. Document tests performed and submit in writing to Contract Administrator.

.14 Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation. Do not use sweeping compounds.

.15 Where flooring adjoins thicker floor materials, apply levelling screed, feather out to make up difference in level between materials.

.16 Spray paints, permanent markers and other indelible ink markers shall not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and permanently stain the flooring material. If such contaminants are present on the substrate they shall be mechanically removed prior to the installation of the flooring material.

3.3 General Installation Requirements

.1 Comply with CRI Carpet Installation Standard 2015 by applicable installation method and manufacturer’s written installation requirements.

3.4 Installation - Carpet Tile

.1 Select the appropriate adhesive and trowel notch configuration recommended by the carpet, and adhesive manufacturers.

.2 Determine quadrants by grid line of area using standard tile laying methods, or use laser alignment.

.3 Pressure sensitive adhesive:

.1 Use a 200 mm (8") wide paint roller to apply adhesive full spread over substrate area.

.2 Allow adhesive to set until surface becomes tacky to the touch but no adhesive is transferred.

.4 Install carpet tile in patterns as indicated.

.5 Lay carpet tiles accurately and firmly along centre lines of selected quadrants. Follow with subsequent tiles within quadrant using 'stair-step' techniques.

.6 As tiles are installed, frequently check all joints with fingers to ensure proper alignment. Do not install tiles that are out of alignment.

.7 Measure out 11 carpet tiles to attain the cumulative space gained over 10 joints, which shall not exceed 6 mm (1/4"). Repeat frequently throughout installation.

.8 Carefully butt tiles together, avoiding too much pressure which may cause peaks or buckles. Brush back face pile and tip tile into place to avoid pile being caught in joint. Anchor all cut tile and perimeter tiles with release adhesive.

.9 Make cuts from backs of tiles using templates for fitting around columns, service cut-outs and the like.

.10 Finish and adhere securely along the wall line; with a smooth, neat appearance where no wall base materials are indicated; and concealed beneath base materials where wall base materials are indicated. Base materials shall be installed after installation of carpet.

.11 Install carpet accurately fitted at perimeter of rooms, cut with precision at columns, door frames and at other obstructions. At columns and other penetrations, cut carpet with maximum possible coverage.

.12 Extend carpet tile into recesses and closets and around fixtures and service devices.

.13 Allow no traffic over installation until adhesives have fully cured, minimum 24 hours.

.14 Installed carpet shall be free from perceptible variance in colour, stains, baldness, tears, fraying, patchwork, and other defects detrimental to good performance and appearance.

3.5 Installation - Transition Trim

.1 Protect exposed edges of flooring, where finished and unfinished areas adjoining, by means of a transition trim butting to and flush with the finished surface of the flooring covering material and securely adhered to the substrate material.

.2 Set transition trim to height as required to cover carpet backing and not protrude above carpet fibres. Review heights with Contract Administrator not later than 5 days prior to installation.

.3 Set transition trim to encapsulate carpet edge at carpet gripper installations.

.4 Allow coiled vinyl material to lay flat for at least 24 hours at ambient temperatures specified above prior to installation.

.5 Set to ensure installation is free of gaps.

.6 Install transition trim in longest lengths possible.

.7 Install transition trim straight to maximum variation of 3 mm (1/8") over 3 m (10’-0").

.8 Scribe and fit transition trim to obstructions.

.9 Fit transition trim joints tightly, straight and vertical as applicable and not less than 610 mm (24") from corners.

.10 Mitre transition trim corners.

3.6 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.1 Field tests and inspections:

.1 Moisture and alkalinity:

.1 Test for moisture vapour transmission in accordance with ASTM F710-22 and ASTM F1869-22 or ASTM F2170-19a in accordance with manufacturer’s written flooring installation requirements. Results must not exceed 170 µg/m² (3 lb per 1,000 ft²) in 24 hours when tested to ASTM F1869-22, or exceed 75% when tested to ASTM F2170-19a.

.2 Test for surface pH. Levels of pH shall not exceed the written recommendations of the flooring manufacturer and adhesive manufacturer. Test in accordance with ASTM F710-22.

.3 For each test type: Conduct 3 tests for flooring applications up to 93 m² (1000 ft²) in area, and 1 additional test for each additional 93 m² (1000 ft²) of flooring area.

.4 Testing shall be verified by independent inspection and testing company and in accordance with Section 01 45 00.

.2 Adhesion bond test:

.1 Proceed with bond test after substrates have been prepared and alkalinity and moisture test have been completed.

.2 Select six substrate test areas, each 915 mm (3’-0”) x 915 mm (3’-0”) in size. Test areas shall be spaced a minimum 1220 mm (48") apart.

.3 Using the specified adhesive, glue down carpet tiles using adhesive manufacturer’s recommended trowel.

.4 After 72 hours, attempt to remove the carpet tiles by pulling up from the corners.

.5 Testing shall be verified by independent inspection and testing company and in accordance with Section 01 45 00.

3.7 Adjusting and Cleaning

.1 After installation is completed, clean and vacuum carpet of dirt, dust and foreign materials. Remove spots with suitable spot remover, remove cuttings, vacuum carpet thoroughly using approved commercial type equipment and leave clean. Provide necessary commercial vacuum cleaning equipment.

3.8 Protection

.1 Prohibit foot traffic on installed flooring for a period of 24 hours after installation. No heavy traffic, rolling loads, or furniture placement are permitted for a minimum of 72 hours after installation.

.2 Protect new floors from time of final set of adhesive until final inspection.

.3 Install floor protection in areas where work, repairs and installation of equipment, and foot traffic will occur.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Acoustic wall panels; AWP1.

.2 Acoustic wood wall panels; AWP4.

1.2 Administrative Requirements

.1 Coordination:

.1 Coordination of work: coordinate layout and installation of acoustic wall panels and support systems components with other work supported by or penetrating through acoustic wall panel systems.

.2 Coordinate with Section 06 40 00 to schedule supply of wood veneer facing so that wood panels are fabricated in accordance with the construction progress schedule.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data:

.1 Submit Material data sheets for work of this section, complete with required anchors.

.3 Shop drawings:

.1 Shop drawings shall indicate panel layout and system components for each panel system.

.2 Include plans, elevations, sections and large scale details, and indicate components and methods of assembly, materials and their characteristics, fastenings, finishes, and other fabrication information required for the work of this section. Indicate assembly joint lines.

.3 Submit coordination drawings indicating locations of concealed grounds, cutouts, plates, and other required fabrications.

.4 Show relation to adjoining construction, details of outside and inside corners and door openings.

.4 Samples:

.1 Submit 2 - 300 mm x 300 mm (12" x 12") samples of each component of panel system to Contract Administrator for review.

.2 Samples shall fully represent materials to be supplied in colour, texture, finish and construction.

.5 Acoustic data:

.1 Submit acoustic data verifying that Materials meet specified acoustic design requirements.

.2 Acoustic data shall include detailed descriptions of both mounting method and test method used to calculate acoustical performance, complete with references to codes and standards used in such calculations.

.3 Acoustic data submitted shall be from a certified acoustic testing agency.

.6 Test reports:

.1 Submit Flame Spread Value (FSV) and Smoke Developed Value (SDV) test results for each wood system as tested by independent inspection and testing agency for wood wall panel assembly.

.7 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

.3 Maintenance materials:

.1 Maintenance materials: At completion, hand over to the City an additional 5% of each type of fabric installed in the Work, but not less than 15 sqm.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

.2 Mock-ups:

.1 Submit 300 mm x 300 mm (12" x 12") mock-up of each acoustical wall panel system, for review and acceptance by Contract Administrator.

.2 Install at the Site a pre-selected mock-up of full size panel system.

.3 Obtain Contract Administrator's acceptance of surface, finish and workmanship as a standard by which remainder of the project will be judged. Apply material in accordance with manufacturer's written application requirements. Mock-up must be approved and accepted prior to start of system application. Maintain mock-up during construction for workmanship comparison. Do not alter, move or destroy mock-up until the work is completed and approved by Contract Administrator.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

PART 2- PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 General

.1 Single source responsibility: Obtain system components for each panel system type from a single source with resources to provide Materials of consistent quality in appearance and physical properties without delaying progress of the Work.

2.3 Acoustic Panels – Shop Built; AWP1

.1 AWP1; Acoustic felt panel system:

.1 Felt panels:

.1 100% polyester fibre felt.

.2 Thickness: Refer to Material Schedule.

.3 Colour: Refer to Material Schedule.

.4 Edges: Exposed.

.5 Mounting: Adhesive.

.1 Adhesives: as recommended by acoustic felt manufacturer.

.6 Trims:

.1 End-of-run trim.

.2 Outside corner trim.

.7 Flammability

.1 Fabric and acoustic fibreglass must conform to a flamespread rating of 25 or under in accordance with CAN/ULC-S102-10.

.2 Fabrics that do not meet the CAN/ULC-S102-10 test requirements will be flame treated to meet NFPA 701-2015 Small or Large Scale Vertical Burn tests unless inherently flame retardant.

.8 NRC: minimum 0.7.

.9 Acceptable Material: as indicated on Material Schedule.

.1 Substitutions: in accordance with Section 01 25 00.

.2 AWP4; perforated wood wall panel:

.1 Planks: standard tongue and groove planks fabricated of wood veneer on industrial grade medium density fiberboard. MDF to be manufactured from pre-consumer recycled wood from sustainably managed forests with formaldehyde-free adhesives.

.1 Wood species and finish: as indicated on Material Schedule.

.2 Panel size: as indicated on Material Schedule.

.3 End joints: as indicated on Material Schedule.

.4 Acceptable Material:

.1 as indicated on Material Schedule.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Flame Spread Performance:

.1 Unless otherwise indicated materials and assemblies forming part of work of this section shall have flame spread rating of 25 or less in accordance with CAN/ULC-S102-10.

.3 Backing fabric: Nonwoven, black, glass fibre matt, 60 g/m² (0.012 psf) surface weight.

.4 NRC: minimum 0.55.

.5 Fasteners: as recommended by manufacturer.

PART 3- EXECUTION

3.1 Examination

.1 Gypsum board assemblies shall be taped and sanded by Section 09 29 00 and painted in accordance with Section 09 91 00 and shall not permit any air leakage through wall.

.2 Concrete masonry unit walls shall have flush joints and painted in accordance with Section 09 91 00 and shall not permit any air leakage through wall.

.3 Do not proceed with installation until unsatisfactory conditions have been corrected. Beginning of installation indicates acceptance of existing substrate conditions.

.4 Do not start installation until exterior glazing has been completed and exterior openings are closed in. Ensure wet work is completed and dried out to a degree acceptable to panel manufacturer before installation is commenced. Maintain uniform temperatures of at least 16°C for 72 hours prior to commencement of the work of this section and maintain temperature until completion of the work of this section.

.5 Do not commence installation until work of other sections behind panels has been completed, inspected and accepted by Contract Administrator.

3.2 Installation - Panels

.1 Install acoustical panels to clean, dry and firm substrates in accordance with manufacturer's written requirements.

.2 Install system in accordance with manufacturer's written installation requirements.

.3 Panel arrangements as indicated. Maintain dimensions and contours as indicated. Coordinate layout with Contract Administrator prior to commencing installation.

.4 Make allowance for thermal movement.

.5 Panels shall have no visible fastenings.

.6 Install fabric systems with matching grain patterns and textures, level, plumb and true free from wrinkles, sags, blisters, waves, and ripples. Installed fabric shall not puddle or dent when touched or leaned upon. Installed fabric shall be self-healing when pushed, punched, or hit and shall revert to original finished condition.

.7 Seaming of fabric by sewing is not permitted.

.8 Mounting methods:

.1 Shop built panels:

.1 Direct mounted with concealed slide and engage z-clips and wall clips above 1830 mm (72") only.

.2 Where corner of substrate wall is not 90° and panels butt in corner, cut one panel with bevelled edge so panels butt and no gap is exposed.

.3 Provide 3 mm (0.12") vertical reveal between panels and 20 mm (0.8") horizontal reveal at 2124 mm (83.6") above finished floor.

.2 Wood wall panels:

.1 Provide concealed fasteners and furring strips spaced 610 mm (24") on centre for a complete, single source installation.

.2 Lay up insulation in uniform pattern, running bond unless otherwise indicated on drawings, with joints butted tightly. Cut insulation in a precise manner, to produce clean cut edges, with joints of 2 mm (0.08").

.3 Locate longitudinal joints behind slats, where applicable. Locate perpendicular joints where accepted by Contract Administrator, arranged in full-size evenly arranged layout.

3.3 Installation Tolerances

.1 Install panels plumb, level, tight, rigid, and secured.

.2 Comply with the following maximum tolerances:

.1 Plumb and level: 3 mm (1/8").

.2 Variation from indicated position: plus/minus 3 mm (1/8").

.3 Maximum variation of reveal widths: plus/minus 1.5 mm (1/16").

.4 Maximum variation of surfaces intended to be flush: plus/minus 1.5 mm (1/16").

3.4 Adjusting and Cleaning

.1 Examine work of this section on completion and replace uneven or defective materials, eliminate all waves, remedy damaged exposed finished surfaces and remove soiled or stained areas.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Interior prefinished corrugated metal acoustic wall panels; AWP2.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Shop drawings shall contain plans, elevations, sections and details for work in this section.

.4 Samples:

.1 Submit duplicate 610 mm x 610 mm (24" x 24") size colour samples of the specified finish for final selection and approval of colour and gloss by the Contract Administrator.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Closeout Submittals

.1 Submit required closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's cleaning and maintenance instructions for incorporation into operation and maintenance manuals in accordance with Section 01 78 00.

1.4 Quality Assurance

.1 Mock-up:

.1 Before proceeding with final purchase of materials and fabrication of metal wall panel system components, prepare a mock-up of work. Incorporate materials and methods of fabrication and installation identical with project requirements.

.2 Install mock-up at location directed by Contract Administrator. Retain accepted mock-up as quality standard for acceptance of completed metal cladding.

.3 Provide mock-up of sufficient size and scope to show typical pattern of seams, fastening details, edge construction, and finish texture and colour.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 System:

.1 The warranty is a total system warranty.

.2 Labour, materials, and workmanship for work of this section.

.3 Duration: 5 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 The following minimum performance criteria apply to the systems to be provided as part of the work of this section, unless otherwise indicated or specified:

.1 Acoustical performance: NRC 0.80 when tested in accordance with ASTM C423-23.

2.3 Corrugated Metal Panel (AWP2)

.1 Metal sheet:

.1 Zinc coated sheet steel: in accordance with ASTM A653/A653M-18 with coating designation Z275 (G90) to ASTM A924/A924M-22a unless otherwise indicated.

.2 Aluminum-zinc alloy coated sheet steel: in accordance with ASTM A792/A792M-10 with coating designation AZM180 to ASTM A924/A924M-22a.

.3 Preformed nominal steel thickness: minimum 0.61 mm (24 gauge).

.4 Profile: Corrugated.

.5 Perforations:

.1 Openness: 40%.

.2 Holes: round, 3 mm (1/8") diameter.

.3 Pattern: spaced 4.8 mm (3/16") staggered centres.

.6 Orientation: as indicated.

.7 Finish:

.1 Shop painted, colour to later selection by Contract Administrator from manufacturer's full range.

.2 Accessories and hardware:

.1 Zinc coated steel to meet specified requirements of CAN/CSA G164-18, hot dip galvanized after fabrication.

.2 Exposed trim, end and flute closures, cap pieces, flashings, and the like, of same metal material, finish, and colour as prefinished metal panels.

.3 Fasteners:

.1 Self-drilling, Type 304 stainless steel.

.2 Head finish:

.1 Type 304 stainless steel, in concealed locations.

.2 Prepainted metal, colour to match prefinished metal panels in exposed locations.

.4 Sealants:

.1 Sealants and joint backing: in accordance with Section 07 92 00.

.2 Colour: to later selection by Contract Administrator from manufacturer’s standard colour chart.

.5 Metal support systems and furring: in accordance with Section 09 22 00.

2.4 Black Acoustic Insulation

.1 Black faced acoustic batt insulation.

.2 Flame Spread: 25 or less in accordance with CAN/ULC-S102-10.

.3 Thickness: 50 mm (2") or as indicated.

.4 Acceptable Materials:

.1 Owens Corning ‘SelectSound Black Acoustic Blanket’.

.2 Substitutions: in accordance with Section 01 25 00.

.5 Fasteners: as recommended by manufacturer.

2.5 Fabrication

.1 Form prefinished metal panels to profiles indicated with bends sharp and true.

.2 Fabricate to conform to requirements of Contract Documents and reviewed shop drawings, and to allow for structural movements within the systems.

.3 Ensure that metal panels are free of steel contamination from rollers.

.4 Cooperate with applicable sections to ensure coordination required for proper installation of work of this section in conjunction with and incorporated with other work.

.5 Fabricate metal cladding panels in one length; maximum 6000 mm (20') for horizontal application; 12000 mm (40') for vertical application; unless otherwise indicated.

.6 Prefinished metal panel terminations shall not have a raw metal edge or exposed fasteners. Panel ends shall be folded.

PART 3- EXECUTION

3.1 Examination

.1 Take measurements at the Site to ensure that the work of this section is fabricated to fit structure, surrounding construction, around obstructions and projections in place.

.2 Verify that backup construction is aligned for proper installation of prefinished metal panel system before commencing erection.

3.2 Installation - Metal Panel

.1 Panel system shall be installed in accordance with manufacturer’s recommendations.

.2 Erect metal support systems in accordance with Section 09 22 00 and metal panel manufacturer’s recommendations.

.3 Erect panels in straight lines that are true, level, and plumb.

.4 Allow for differential thermal and structural movement between systems and structure as well as between elements of system.

.5 Fasteners: Face-fix fasteners at predetermined, regular pattern.

.6 Install sealant between work of this section and work of other sections to meet specified requirements of Section 07 92 00 and to provide a watertight installation.

3.3 Installation Tolerances

.1 Maintain the following installation tolerances:

.1 Maximum variation from plane or location shown on reviewed shop drawings: 3 mm (1/8") / 3 m (9.8 ft) of length and up to 30 mm (1-1/6")/100 m (328 ft) maximum.

.2 Do not exceed 10 mm (3/8”) from drawings locations.

.3 Maximum offset from true alignment between two adjacent members abutting end to end, in line: 1 mm (0.039").

3.4 Adjusting and Cleaning

.1 Small chips, imperfections, blemishes or other defects may be made good with the approval of the architect.

.2 Defects shall be repaired with colour matched synthetic enamel and 2-part epoxy where ground coat is breached.

.3 Upon completion of the work of this section, remove protective covering and paper labels from exposed surfaces, and clean from surfaces smears, dirt and grime with cleaning materials as recommended by the panel supplier.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Painting of exterior paintable surfaces.

.2 Painting of interior paintable surfaces.

.2 Paintable and non-paintable surfaces:

.1 Paint and finish paintable surfaces included in the Work, except where excluded by the Contract Documents.

.2 The following surfaces are considered non-paintable, except as otherwise indicated or scheduled:

.1 Material and equipment furnished prime and finish painted.

.2 Internal surfaces of steel tanks and stacks.

.3 Sprayed fire-resistive materials.

.4 Exterior concrete.

.5 Stainless steel, weathering steel, copper, bronze, chromium plate, nickel, anodized or lacquered or mill finished aluminum, Monel metal.

.6 Insulation, glass, plastic, brick, stone.

.7 Metallic and mastic insulation finishes.

.8 Abrasive material finishes on floors, stair treads, stair nosing and landings.

.9 Insulated electric cables.

.10 Machined parts of machinery and equipment.

.11 Concealed surfaces.

.12 Manufactured finish materials.

.13 Special spray textured finishes.

.14 Special plaster finishes.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets and list of Materials proposed for use in the work of this section as identified in ‘Approved Product List’ section of the MPI (Master Painters Institute) Architectural Painting Specification Manual. Correlate Materials to Schedule furnished by Contract Administrator.

.3 Samples:

.1 Samples for initial paint colour and finish selection:

.1 Submit manufacturer's colour charts showing full range of colours available, including light and deep dark tones, for each type of finish material indicated for colour selection by Contract Administrator.

.2 Contract Administrator shall have complete freedom in choice of colours in compiling colour schedule and will not necessarily select colours from standard colour charts of manufacturer of Materials specified.

.3 Submit 3 drawdowns of each selected colour for review by Contract Administrator and resubmit to Contract Administrator as required to obtain approval. Drawdown to be of specified colour, sheen, and paint formula for applicable surface.

.2 Samples for verification:

.1 Submit 3 samples on 200 mm x 305 mm (8"x 12") material of same type as that on which coating is to be applied, for Contract Administrator's approval, at least 30 days before materials are required.

.2 Identify each sample as to project, finish, formula, colour name, number, gloss name and number, date and name of Contractor and painting Subcontractor.

.3 Resubmit as required until colours and gloss value are approved.

.4 MPI (Master Painters Institute) Manual:

.1 Provide and maintain 1 copy of MPI Manual, latest edition, at site office for reference. Provide and pay for 1 year subscription for Contract Administrator for access to MPI manual.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer’s operation and maintenance instructions for inclusion in the operation and maintenance manuals.

.3 Maintenance materials:

.1 Provide 2 sealed containers, each of 4 litres (1 gallon) capacity of each paint product in each colour used in the Work for City’s maintenance use. Containers shall be new, clearly labelled with manufacturer's name, type of paint, colour and colour number. Store at Site where directed by City.

1.5 Quality Assurance

.1 Qualifications

.1 Manufacturers:

.1 Paint manufacturers and Materials used shall be as listed under the Approved Product List section of the MPI Painting Manual.

.2 Installers / applicators / erectors:

.1 Applicators: Shall have minimum 5 years proven satisfactory painting experience of projects of similar size and class subject to Contract Administrator's approval.

.2 Only qualified journeymen who have a "Tradesman Qualification Certificate of Proficiency" shall be engaged in painting work. Apprentices shall work under the direct supervision of a qualified journeyman in accordance with trade regulations.

.2 Mock-ups:

.1 Provide mock-ups of each paint system for indicated surfaces of each colour and finish selected to verify preliminary paint selections made under Sample submittals.

.2 Mock-ups shall be located to areas as directed by Contract Administrator under lighting conditions matching final area lighting, for acceptance by Contract Administrator.

.3 Mock-ups shall demonstrate aesthetic effects of paint colour and sheen and shall set quality standards for material and execution of the Work. Final approval of colour and finish selections shall be based on mock-ups. If colour selections are not approved, apply additional mock-ups of additional colours selected by Contract Administrator at no added cost to the City.

.4 Do not proceed with work, including ordering of paint Materials, until mock-ups of each paint colour and finish and paint system for indicated surfaces have been reviewed and accepted by Contract Administrator.

.5 Provide the following in-situ mock-ups:

.1 Concrete block, concrete and gypsum board: 9.3 m^2 (100 ft^2) of vertical surfaces and 9.3 m^2 (100 ft^2) of horizontal surfaces.

.2 Hollow metal doors and frames: 1 door and frame for each finish specified.

.3 Painted wood base.

.4 Site painted structural steel, Contract Administrator shall designate steel items and to be included as part of mock-up.

.6 Upon completion and approval, mock-ups shall serve as a standard for the balance of the work of this section. Subsequent work carried out and not in the Contract Administrator's opinion equal to standard shall be repainted without charge.

1.6 Product Handling

.1 Product handling shall be in accordance with Section 01 60 00 as supplemented by the requirements of this section.

.2 Deliver painting materials in sealed, original labelled containers bearing manufacturer's name, brand name, type of paint or coating and colour designation, standard compliance, materials content as well as mixing and/or reducing and application requirements.

.3 Store paint Materials and materials in original labelled containers in secure (lockable), dry, heated and well ventilated single designated area meeting minimum requirements of both paint manufacturer and authorities having jurisdiction, and at a minimum ambient temperature of 7°C.

.4 Protect floor and wall surfaces of storage area. Protect floors with sheets or clean plywood or metal pans where mixing is being carried out.

1.7 Site Conditions

.1 Comply with environmental requirements of MPI Manual.

.2 Perform no painting work when ambient air and substrate temperatures are below 10°C for both interior and exterior work, unless suitable weatherproof covering and sufficient heating and ventilation facilities are in place in accordance with MPI Manual.

.3 Perform no painting work when relative humidity is above 85% or when dew point is less than 3°C (5°F) variance between air/surface temperature.

1.8 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranties:

.1 System:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

.5 All paint to be lead and cadmium free.

2.2 Performance/Design Requirements

.1 Except where more stringent requirements are specified, the following reference standard shall govern the work of this section:

.1 Master Painters Institute (MPI) Architectural Painting Specification Manual (MPI Manual), including Identifiers, Evaluation, Systems, Preparation and Approved Product List, latest edition, and referenced herein as the MPI Manual, as issued by the local MPI Accredited Quality Assurance Association having jurisdiction.

.2 Materials, preparation and workmanship shall conform to requirements of latest edition of Architectural Painting Specification Manual by the Master Painters Institute (MPI) (hereafter referred to as the MPI Painting Manual) as issued by the local MPI Accredited Quality Assurance Association having jurisdiction.

.3 Painting systems:

.1 Shall remain free from failure due to causes including: material failure; surface preparation less than that specified; and paint film thickness less than that specified, or when not specified, less than that coverage recommended by manufacturer.

.2 Presence of any of following shall constitute failure: visible corrosion; film peeling, blistering, checking, scaling, embrittling or general film disintegration; and poor adhesion as determined by tape "peel-off" test procedures.

2.3 Materials

.1 Materials listed in MPI Manual shall be used in the Work, unless specified otherwise.

.2 Paint and materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, and the like) shall be in accordance with the MPI Manual “Approved Product” listing and shall be from a single manufacturer for each system used.

.3 Other paint materials, such as linseed oil, shellac, and the like, shall be highest quality Materials of an approved manufacturer listed in the MPI Manual and shall be compatible with other coating materials as required.

.4 Paint materials shall have good flowing and brushing properties and shall dry or cure free of blemishes or sags.

.5 Where required, paints and coatings shall meet flame spread and smoke developed ratings designated by building code requirements and/or authorities having jurisdiction.

2.4 Equipment

.1 Painting and coating equipment in accordance with written requirements of MPI Manual.

2.5 Mixing and Tinting

.1 Unless otherwise specified, paints shall be ready-mixed. Re-mix prior to application to ensure colour and gloss uniformity.

.2 Paste, powder or catalyzed paint mixes shall be mixed in accordance with manufacturer’s written requirements.

.3 Perform colour tinting operations prior to delivery of paint to Site.

.4 Where thinner is used, addition shall not exceed paint manufacturer’s recommendations.

2.6 Colours and Gloss Levels

.1 Paint colours and gloss levels shall be as selected by the Contract Administrator. Locations as indicated or scheduled.

.2 Colour and gloss schedule: Refer to Material Schedule.

.3 Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following MPI values:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat finish	0 to 5	10 maximum
G2	Velvet finish	0 to 10	10 to 35
G3	Eggshell finish	10 to 25	10 to 35
G4	Satin finish	20 to 35	35 minimum
G5	Semi-gloss finish	35 to 70	
G6	Gloss finish	70 to 85	
G7	High-Gloss finish	> 85	

PART 3 - EXECUTION

3.1 Examination

.1 Verify that specified site conditions exist before commencing the work of this section.

.2 Prior to commencement of work of this section, examine surfaces scheduled to be painted.

.3 Check moisture content and alkalinity of surfaces to be painted in accordance with Field Quality Control paragraphs of Section 09 91 00.

.4 Inspect surfaces to be coated for gouges, marks, nibs, and other defects and properly prepare patching, filling, smoothing or other surface preparation necessary to ensure satisfactory finish.

.5 Report in writing any condition adversely affecting work of this section.

.6 Proceed with work only when surfaces and conditions are satisfactory. Remove dust, grease, rust, scale and extraneous matter, tool and machine marks and insects from surfaces which could be detrimental to a satisfactory and acceptable finish.

3.2 Preparation

.1 Comply with manufacturer's written requirements and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

.2 Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

.1 After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

.3 Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, mildew, grease, and incompatible paints, encapsulants, and other deleterious materials.

.4 Paint surfaces when moisture content or alkalinity of surfaces to be painted comply with Field Quality Control paragraphs in Section 09 91 00.

.5 Concrete substrates: Remove release agents, curing compounds, efflorescence, and chalk.

.6 Masonry substrates: Remove efflorescence and chalk.

.7 Shop-primed steel substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

.8 ZF75 and ZF120 galvannealled-metal substrates: Remove grease and oil residue from galvannealled sheet metal by methods to produce clean surfaces that promote adhesion of subsequently applied paints.

.9 Z275 galvanized-metal substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

.10 Aluminum substrates: Remove loose surface oxidation.

.11 Wood substrates for paint finish:

.1 Scrape and clean knots, and apply coat of knot sealer before applying primer.

.2 Sand surfaces that will be exposed to view, and dust off.

.3 Prime edges, ends, faces, undersides, and backsides of wood.

.4 After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 Installation

.1 Do not paint unless substrates are acceptable and/or until Field Conditions (heating, ventilation, lighting and completion of work of other sections) are acceptable for applications of Materials.

.2 Apply primer, paint or stain in accordance with MPI Manual finish requirements based on Grade specified below in Section 09 91 00.

.3 Schedule application of paints and coatings after cleaning to prevent field conditions causing flash-rusting, rusting, weathering or water damage to substrate, or other contamination of the substrate. Comply with MPI manual and manufacturer’s written requirements, the most stringent of which shall govern.

.4 Painting coats specified are intended to cover surfaces satisfactorily when applied at proper consistency and in accordance with manufacturer’s recommendations.

.5 Tint each coat of paint progressively lighter to enable confirmation of number of coats.

.6 Unless otherwise approved by Contract Administrator, apply a minimum of 4 coats of paint where deep or bright colours are used to achieve satisfactory results.

.7 Sand and dust between each coat to provide an anchor for next coat and to remove defects visible from a distance up to 1000 mm (39").

.8 Do not apply finishes on surfaces that are not sufficiently dry. Unless manufacturer's directions state otherwise, each coat shall be sufficiently dry and hard before a following coat is applied.

.9 Prime coat of stain or varnish finishes may be reduced in accordance with manufacturer's directions.

.10 Paint finish shall continue through behind wall-mounted items (i.e. chalk and tack boards) and exposed/ visible in complete work including interiors of cupboards and closets, tops of doors, trim, and the like, whether in sight line or not, including behind surface mounted fixtures and heating units.

.11 Contract Administrator shall have right to make changes in colour tone of finishes prior to final coat to obtain desired results without additional cost to City.

.12 Access doors, prime coated butts and other prime painted hardware, registers, radiators and covers, exposed piping and electrical panels shall be painted to match adjacent surfaces in terms of colour, texture and sheen, unless otherwise indicated.

3.4 Mechanical and Electrical Items

.1 Finish paint primed mechanical and electrical items with 2 coats of paint. Include for the following list unless otherwise indicated:

.1 Conduit.

.2 Diffusers.

.3 Ductwork.

.4 Grilles.

.5 Hangers.

.6 Fire extinguisher cabinets.

.7 Louvres.

.8 Stacks.

.9 Vents.

.2 Prime and paint exposed insulated and bare pipes. Prime and paint exposed conduits and electrical raceways, fittings, outlet boxes, junction boxes, pull boxes and similar items. Use heat resistant epoxy paint on pipes and surfaces where operating surface temperature exceeds 65°C.

.3 Coordinate the painting of pipes, and coverings with mechanical contractor applying colour banding, flow arrows and pipe identification after the painting of pipes and coverings.

.4 Paint work to match adjacent walls and ceilings unless directed otherwise.

.5 Paint interior surfaces of air ducts and pipe trenches including heating pipes and elements that are visible through grilles and louvres with one coat of flat metal paint to limit of sight-line. Paint to be black or white as directed by Contract Administrator.

.6 Gas pipes, whether concealed or exposed, shall be painted in accordance with gas code.

.7 Paint and finish wall surfaces behind convectors. Walls to be finished prior to installation of convector covers. Touch up walls after covers are installed as necessary to make good installation damage.

.8 Air diffusers shall be primed and finished with 2 coats of paint of same colour and sheen as ducts and/or ceiling.

3.5 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.1 Field tests and inspections:

.1 Paint and Coating Quality Assurance Inspections:

.1 Field quality control shall be in accordance with Section 01 45 00.

.2 Moisture and alkalinity testing:

.1 Check moisture content of surfaces to be painted using properly calibrated electronic moisture meter approved by paint manufacturer and Contract Administrator, or other approved method. Maximum moisture contents shall be in accordance with manufacturer's recommendations and as follows:

.1 Concrete and concrete masonry (clay and concrete brick/block): Maximum 12%.

.2 Gypsum board and plaster: Maximum 12%.

.3 Wood: Maximum 15%.

.2 Conduct moisture tests on concrete floors using cover patch test method.

.3 Test concrete, masonry and plaster surfaces for alkalinity.

.3 Painted surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent to the Contract Administrator:

.1 Brush / roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.

.2 Evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.

.3 Damage due to touching before paint is sufficiently dry or any other contributory cause.

.4 Damage due to application on moist surfaces or caused by inadequate protection from weather.

.5 Damage and/or contamination of paint due to blown contaminants (dust, spray paint, etc.).

.4 Painted surfaces shall be considered unacceptable if any of the following are evident under natural lighting source for exterior surfaces and final lighting source (including daylight) for interior surfaces to the Contract Administrator:

.1 Visible defects are evident on vertical and horizontal surfaces when viewed at normal viewing angles from a distance of not less than 1000 mm (39").

.2 Visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.

.3 When final coat on any surface exhibits a lack of uniformity of colour, sheen, texture, and hiding across full surface area.

.5 Painted surfaces rejected by the Contract Administrator shall be made good at the expense of the Subcontractor. Small affected areas may be touched up; large affected areas or areas without sufficient dry film thickness of paint shall be repainted. Runs, sags of damaged paint shall be removed by scraper or by sanding prior to application of paint.

.6 Painting Subcontractor shall obtain from Contractor written confirmation of specific surface preparation procedures and primers used for fabricated steel items from the fabricator/supplier to ascertain appropriate and manufacturer compatible finish coat materials to be used before painting any such work.

3.6 Adjusting and Cleaning

.1 Promptly as work proceeds and on completion of Work, remove paint where spilled, splashed or spattered during the progress of the Work. Keep the premises free from unnecessary accumulation of tools, equipment, surplus materials and debris; at the conclusion of the work leave the premises clean.

3.7 Exterior Paint Systems

.1 System references listed are based on MPI Manual and are Premium Grade, unless otherwise indicated:

.1 Concrete vertical surfaces: (including horizontal soffits)

.1 EXT 3.1A Latex finish (over alkali resistant primer); gloss level: G3.

.2 Structural steel and metal fabrications:

.1 EXT 5.1D Alkyd (over alkyd primer); gloss level: G5.

.3 Galvanized metal (not chromate passivated): (for high contact / high traffic area doors, frames, railings, misc. steel, pipes, etc.; for low contact / low traffic area overhead decking, ducts, gutters, flashing, etc.)

.1 EXT 5.3N Alkyd (over water based galvanized primer); gloss level: G5.

3.8 Interior Paint Systems

.1 System references listed are based on MPI Manual and are Premium Grade, Low VOC, unless otherwise indicated:

.1 Concrete vertical surfaces: (including ceilings)

.1 INT 3.1C High performance architectural latex (over alkali-resistant primer); gloss level G3.

.2 Concrete masonry unit assemblies:

.1 INT 4.2P High performance architectural latex finish (over alkali resistant primer); gloss level G3.

.3 Primed ferrous metal; touch-up and finish coats required under this section:

.1 Ferrous metal fabrications: Prepared and primed in accordance with Sections 05 12 00 and 05 50 00.

.2 INT 5.1R High performance architectural latex (over alkyd primer); gloss level G3.

.4 Galvanized metal: (doors, frames, railings, misc. steel, pipes, overhead decking, ducts, etc.)

.1 INT 5.3M High performance architectural latex (over water based galvanized primer); gloss level G5.

.5 Dressed lumber: (including doors, door and window frames, casings, mouldings, etc.)

.1 INT 6.3A High performance architectural latex (over latex wood primer); gloss level G5.

.6 Plaster and gypsum board: (gypsum wallboard and textured finishes)

.1 INT 9.2B High performance architectural latex finish (over latex primer/sealer):

.1 Gloss level:

.1 Walls, except as otherwise indicated: G3.

.2 Ceilings, except as otherwise indicated: G1.

.3 Wet and service areas; walls and ceilings: G5.

.2 Use high-hide primer sealer type at glass mat finished gypsum board.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Tackboards (TB1).

.2 Related trim, adhesives, and fastenings.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Show proposed system of anchorage and materials being supplied on shop drawings submitted for review.

.2 Show dimensional layouts, hardware items, anchorage devices, dimensions, description of materials and finishes, and all other pertinent information.

.4 Samples:

.1 Submit 305 mm x 305 mm (12" x 12") samples of each Material specified, diagonally cut to show cross section through assembly, complete with accessories and trim.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

1.4 Quality Assurance

.1 Qualifications:

.1 Installers / applicators / erectors:

.1 Erection of materials to be carried out by competent workers supervised by a foreperson with at least 10 years' experience in this specialized field and approved in writing by manufacturer for installation of their Material.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Provide manufacturer's standard product warranty.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Design/Performance Requirements

.1 Trademarks and labels:

.1 No trademarks or labels will be accepted on exposed finished work.

2.3 Tackboards (TB1)

.1 Acceptable manufacturers:

.1 ASI Visual Display Products.

.2 Claridge – CPE Design Solutions.

.3 Delta Products Ltd.

.4 Global School Products Inc.

.2 Forbo cork tackboard: 12.7 mm (1/2") factory prelaminated consisting of 6 mm (1/4") thick Forbo 'Bulletin Board' linoleum cork laminated to 6 mm (1/4") particle board substrate under mechanical pressure in maximum panel sizes of 1524 mm x 4876 mm (5'-0" x 16'-0"). Bonding of materials by a waterproof adhesive that will not delaminate or rupture at the contact surfaces.

.3 Colour: to later selection by Contract Administrator from manufacturer's standard range.

.4 Aluminum trim: in accordance with Trim Components paragraph below.

2.4 Trim Components

.1 Acceptable manufacturers:

.1 ASI Visual Display Products.

.2 Aluminum trim:

.1 Acceptable Products:

.1 ASI ‘Series 9500 Elite Reveal’.

.3 Extruded aluminum components, AA6063 T5 or approved alternative, 25 mm x 25 mm x 3 mm (1” x 1” x 1/8”), mitred corners.

.4 Finish: etched and clear anodized 0.051 mm (0.002") satin finish free from extruding draw marks and surface scratches.

.5 Reveal: Provide 3.2 mm (1/8") reveal between board finish and aluminum frame.

.6 Final assembly to have seamless/welded flush and level butt joints. No visible joints accepted and no intermediate trim.

2.5 Attachment Hardware

.1 Use manufacturer’s standard mounting hardware.

PART 3 - EXECUTION

3.1 Installation

.1 Install in accordance with manufacturer’s written installation requirements.

.2 Locate seams as directed by the Contract Administrator.

3.2 Installation - Trim Components

.1 Install in accordance with manufacturer's written installation requirements.

3.3 Installation Tolerances

.1 Install plumb, level, tight and secured. Comply with the following maximum tolerances:

.1 Within 1.5 mm (1/16”) of plumb and level, and flush with adjacent panels.

.2 Within 25 mm (1”) variation from indicated position.

3.4 Adjusting and Cleaning

.1 Verify under work of this section that installed Materials function properly, and adjust them accordingly to ensure satisfactory operation.

.2 Do not remove protective coatings until final cleaning, or earlier if directed by Contract Administrator.

.3 Refinish damaged or defective work so that no variation in surface appearance is discernible. Refinish work at Site only if approved.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Toilet partitions and doors.

.2 Urinal screens.

.3 Shower compartments.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Show plan layout, elevations, hardware items, anchorage devices, dimensions, description of materials and finishes, and all other pertinent information.

.4 Samples:

.1 Submit 3 samples of each colour of panel and samples of hardware items, and a typical base mounted sample of a pilaster and shoe.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

1.4 Quality Assurance

.1 Qualifications:

.1 Subcontractor:

.1 Has been regularly engaged in the assembly and installation of toilet partition systems.

.2 Shall demonstrate to the acceptance of the Contract Administrator that they have successfully performed on comparable projects over the previous 5 years.

.2 Mock-up:

.1 Provide full scale washroom partition assembly to washroom locations as follows, as designated by Contract Administrator:

.1 Universal change room.

.2 Women's change room.

.3 Child care centre.

.2 Mock-up may be incorporated in the completed work upon acceptance of Contract Administrator.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 System to be designed and installed to meet Class A requirements for fire performance, with a flame spread index of 25 or less and smoke developed rating of 100 or less when tested in accordance with CAN/ULC-S102-10.

.2 Extended privacy / gap-free:

.1 Toilet, shower and change partition assemblies shall have no sightlines, with gap-free interlocking doors and stiles routed to allow for overlap to prevent line-of-sight into the toilet, shower or change compartment.

.2 Privacy strips fastened or adhered to the partition material shall not be acceptable.

.3 Panel heights above floor shall be one of the following, as indicated:

.1 25 mm (1").

.2 115 m (4").

.3 300 mm (12").

2.3 Materials

.1 Acceptable manufacturers:

.1 Bobrick Washroom Equipment of Canada Ltd.

.2 Bradley Corporation.

.3 Global Partitions.

.2 Acceptable Materials:

.1 PH1: Bobrick ‘DuraLine Series CGL 3186.67G’, extended privacy, floor to ceiling, height 2575 mm.

.2 PH2: Bobrick ‘DuraLine Series CGL 2186.67G’, maximum privacy, floor to ceiling.

.3 PH3: Bobrick ‘DuraLine Series CGL 1181’, floor to ceiling braced urinal screen.

.4 PH4: Bobrick ‘DuraLine Series CGL’, post to ceiling braced divider screen, extended privacy panel.

.5 PH5: Bobrick ‘DuraLine Series CGL’, floor anchored, custom height partitions and doors 1150 mm high, standard reduced gap.

.3 Solid phenolic material: Solidly fused plastic laminate with matte-finish melamine surfaces, coloured face sheets, and black phenolic-resin core with exposed milled and polished black edges.

.1 Finished thicknesses:

.1 Pilasters and doors shall be 19 mm (3/4").

.2 Panels shall be 13 mm (1/2").

.4 Colour: as selected by Contract Administrator from manufacturer's full range.

.5 Hardware:

.1 Fabricate from heavy gauge, Type-304 stainless steel with satin finish.

.2 Conceal hardware inside compartments with the exception of out-swinging doors.

.3 Latch (standard):

.1 Sliding door latch: 1.6 mm (0.06") (16 gauge) and shall slide on nylon track.

.2 Sliding door latch shall require less than 2.3 kg (5-lb) force to operate. Twisting latch operation will not be acceptable.

.3 Latch track shall be attached to door by flathead machine screws into factory-installed threaded brass inserts.

.4 Latch handle shall have rubber bumper to act as door stop.

.5 Latch shall allow door to be lifted over 1.6 mm (0.06") (16 gauge) keeper for emergency access.

.6 Metal-to-metal connection shall withstand a direct pull of over 454 kg (1000 lb). per screw.

.7 Provide occupancy indicator latch at PH1 and PH2.

.4 Hinges (institutional):

.1 16-gauge 1.6 mm (0.06") continuous self-closing piano hinge.

.2 Continuous piano hinge shall be attached to door and stile by theft-resistant, one-way, stainless steel machine screws into threaded brass inserts.

.5 Coat hook: constructed of stainless steel and shall project no more than 29 mm (1-1/8") from face of door. Coat hook shall be secured by theft-resistant, one-way stainless steel screws.

.6 Surface mounted door bumper: Stainless steel with neoprene bumper.

.1 Acceptable Material: Bobrick 'B-687'.

.6 Mounting brackets: 1.2 mm (18-gauge) stainless steel and extend full height of panel. U-channels shall be furnished for panel to stile mounting. Angle brackets shall be furnished for stile to wall and stile to panel mounting. Angle brackets shall be furnished for panel to wall mounting.

.7 Levelling device: 5 mm (3/16") hot rolled steel bar; chromate-treated and zinc-plated; through-bolted to solid phenolic stile.

.8 Posts; for post-to ceiling hung screens: 32 mm (1-1/4") square tubing, 18-8 S, Type 304, 1.2 mm thick) (18 gauge) stainless steel with satin finish. Floor and ceiling connections to be constructed of 18-8 S, Type 304, heavy gauge stainless steel.

.9 Headrail; for headrail braced partitions and screens: Extruded anodized aluminum with satin finish. Enclosed construction with sloping top and grip-resistant edge.

.10 Stile shoe shall be one-piece, 102 mm (4") high, Type 304, 0.8 mm (0.03") thick (22 gauge) stainless steel with satin finish. Top shall have 90° turn to stile. Shoe will be composed of one-piece of stainless steel and capable of being fastened) by clip) to stiles starting at wall line.

PART 3 - EXECUTION

3.1 Installation

.1 Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

.1 Maximum clearances:

.1 Pilasters and panels: 12.7 mm (1/2").

.2 Panels and walls: 25.4 mm (1").

.2 Stirrup brackets: Secure panels to walls and to pilasters with no fewer than two brackets attached near top and bottom of panel.

.1 Locate wall brackets so holes for wall anchors occur in masonry or tile joints.

.2 Align brackets at pilasters with brackets at walls.

.3 Floor-anchored units: Set pilasters with anchors penetrating not less than 50 mm (2") into structural floor unless otherwise indicated in manufacturer's written requirements. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.

.4 Floor-and-ceiling-anchored units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust so doors are level and aligned with panels when doors are in closed position.

.5 Urinal screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

.6 Install hardware components and partitions with fastenings and screws to manufacturer's written specification. Attach panel and pilasters to brackets with through type sleeve bolt and nut.

.7 Secure wall brackets to blocking in steel stud walls.

.8 Erect enclosures accurately to dimensions shown, plumbing securely, and anchoring in position. Hang doors; adjust hinges to perform as specified. Re-check doors for emergency feature.

.9 Install system to be free of rattles and reverberations during normal usage.

3.2 Installation Tolerances

.1 Install plumb, level, tight and secured. Comply with the following maximum tolerances:

.1 Plumb and level: 3 mm (1/8").

.2 Variation from indicated position: plus/minus 3 mm (1/8").

3.3 Adjusting and Cleaning

.1 Hardware adjustment:

.1 Adjust hardware so that latches operate smoothly and without binding. Lubricate hardware if required by supplier’s requirements.

.2 Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

.2 Clean exposed surfaces using materials and methods recommended by manufacturer. Provide protection during remainder of construction period.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Operable partition system, paired panel.

.2 Accordion partition.

1.2 Administrative Requirements

.1 Coordination:

.1 Coordinate floor flatness requirements for operable door system with Section 03 35 00.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials and equipment proposed for use in the work of this section.

.3 Shop drawings:

.1 Show location and extent of operable partitions.

.2 Include plans, elevations, sections, details, attachments to other construction, and accessories.

.3 Indicate dimensions, weights, conditions at openings, and at storage areas, and required installation, storage, and operating clearances.

.4 Indicate location and installation requirements for hardware and track, including floor tolerances required and direction of travel. Indicate blocking to be provided by others.

.5 Indicate partition system acoustic performance.

.6 Show imbedded items and cut-outs required in other work.

.4 Samples:

.1 Selection samples:

.1 Submit manufacturer's range of vinyl pattern and colours available for Contract Administrator's selection.

.2 Samples for verification:

.1 Submit 3 samples of each finish specified in manufacturer's standard sizes.

.5 Test and evaluation reports:

.1 Submit a copy of the acoustic performance test report as prepared by an accredited acoustic testing laboratory, attesting performance of operable partition system proposed for use in the work of this section.

.2 Submit copy of the sound rating test report, and letter from manufacturer certifying Material supplied meets or exceeds sound rating specified, indicated, or scheduled in the Contract Documents.

.6 Templates:

.1 Submit templates to affected sections for use by installers and fabricators as required for proper location and installation of partition system.

.7 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified and with approval of Material manufacturers.

1.5 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.1 Duration: 5 years.

.2 Operable partition manufacturer agrees to repair or replace any components with manufacturing defects for a period of 3 years.

PART 2 - PRODUCTS

2.1 Manufacturers

.1 Modernfold.

.2 Corflex.

.3 Moderco.

2.2 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.3 General

.1 Incorporate reinforcing, fastening, and anchorage required for building in of Materials.

2.4 Manual Operable Partition System, Single Panel

.1 Acceptable Materials:

.1 Modernfold Inc. 'Acousti-Seal Encore'.

.2 Substitutions: In accordance with Section 01 25 00.

.2 Operation; manual: Top supported, manually operated paired panels, remote stacking, capable of negotiating 90° turns through "X", "T" or "L" intersections without switching devices.

.3 Panel construction:

.1 Nominal 108 mm (4-1/4") thick panels, in width as required to suit layout as indicated. Panel horizontal and vertical framing members fabricated from minimum 16 gauge formed steel with overlapped and welded corners for rigidity. Top channel reinforced to support suspension system components. Frame designed with full vertical edges of panels formed of steel and provide concealed protection of panel skin edges.

.4 Acoustical performance:

.1 Operable partition system tested in accordance with ASTM E90-09. Minimum Sound Transmission Class (STC) of operable partition system: STC 52 minimum.

.5 Panel finish:

.1 Reinforced heavy duty vinyl with woven backing.

.1 Colour: to later selection by Contract Administrator.

.2 Flame spread rating: maximum 150 in accordance with CAN/ULC-S102-10.

.6 Partition closure:

.1 Manufacturer's standard horizontally expanding panel edge with removable crank.

.7 Panel trim: No exposed panel trim. Hardware to be of one consistent colour as selected by Contract Administrator from manufacturer's standard range.

.8 Hinges:

.1 Manufacturer's full leaf butt hinges and mounting.

.9 Sound seals:

.1 Vertical Interlocking sound seals between panels: Roll-formed steel astragals, with tongue and groove configuration in each panel edge. Rigid plastic or aluminum astragals are not acceptable.

.2 Horizontal top seals: Manufacturer's automatic operable top seals, manually operated operable top seals not required or permitted.

.3 Horizontal bottom seals:

.1 Manufacturer's 'SA2' automatic bottom seals.

.10 Suspension system:

.1 Manufacturer's '#17 Suspension System'.

2.5 Accordion Partition System

.1 Acceptable Materials:

.1 Modernfold Inc. 'Soundmaster #12 Accordion Folding Partition'.

.2 Substitutions: In accordance with Section 01 25 00.

.2 Operation: manually operated, top supported, accordion folding.

.3 Construction:

.1 Steel hinge plates welded to 5 mm (3/16") diameter vertical steel rods, with a single row of plates at the bottom and top with intermediate rows at approximately 1067 mm (42") on center. Partitions 3048 mm (10') high or over have a double row of hinge plates at the top. A high tensile alloy steel trolley yoke, functioning as a hinge pin at required intervals, supports the frame assembly.

.4 Acoustical performance:

.1 Operable partition system tested in accordance with ASTM E90-09. Minimum Sound Transmission Class (STC) of operable partition system: STC 40.

.5 Panel finish:

.1 Reinforced heavy duty vinyl with woven backing.

.1 Colour: as selected by Contract Administrator.

.2 Flame spread rating: maximum 150 in accordance with CAN/ULC-S102-10.

.6 Sound seals:

.1 Shall be pairs of three-layer flexible sweep strips at top and bottom. Vertical female sound channel shall be polyurethane foam lined.

.2 Sound insulation: 24-gauge, V-grooved steel panels and heavy duty flame resistant acoustical membrane. Each panel attaches to the frame with steel leaf fasteners.

.3 Provide pairs of flexible sweep strips at top and bottom of the partition. Air release for air trapped within the folding partition shall be accomplished during operation by a series of 3/8-inch (9.5mm) diameter holes through the lead post molding.

.7 Hardware

.1 Grip type hand pulls shall be die-cast zinc, satin chrome finish. Extruded aluminum or plastic hand pulls will not be accepted.

.2 Locks: Satin chrome hand pulls with master-keyed locks in accordance with Section 08 71 00. Locks shall be an integral part of the pull.

.8 Suspension system

.1 Manufacturer's '#6 Suspension System', or '#7 Suspension System', track and trolley sizes matched to the size of the partition.

.2 Suspension Tracks: Continuous "C" channel shaped track, connected to the structural support.

.3 Carriers: Two-wheel intermediate and four-wheel lead trolley assemblies.

2.6 Fabrication

.1 Fabricate Materials with component sizes, metal gauges, hardware, reinforcing, anchors, and fastenings of adequate strength to ensure that work of this section will remain free of warping, buckling, opening of joints and seams, and distortion within limits of intended use.

PART 3 - EXECUTION

3.1 Examination

.1 Examine and ensure that work done as part of the work of other sections is complete and that there are no conditions which will adversely affect the performance of this work. Notify the Contractor of any unsatisfactory conditions. Do not proceed with this work until unsatisfactory conditions have been corrected.

3.2 Preparation

.1 Preparation of the opening shall conform to criteria set forth per ASTM E557-12(2020) and to meet manufacturers' specifications and written installation instructions.

3.3 Installation

.1 Submit manufacturer's information and templates required for installation of work of this section, and assist or supervise, or both, the setting of anchorage devices, and construction of other work incorporated with Materials specified in this section in order that they function and perform as intended.

.2 Install work of this section to ASTM E557-12(2020) and to meet manufacturers' specifications and written installation requirements and reviewed shop drawings, true, tightly fitted, and level or flush to adjacent surfaces, as suitable for installation.

.3 Include reinforcing, anchorage and mounting devices required for the installation of work of this section.

.4 Fit joints and junction between components tightly and in true planes, conceal and weld joints where possible.

3.4 Adjusting and Cleaning

.1 Verify that installed Materials function properly, and adjust operable partitions to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

.2 Refinish damaged or defective work so that no variation in surface appearance is discernible.

.3 Broken, cracked, chipped, deformed or unmatched panels and finishes are not acceptable.

3.5 Closeout Activities

.1 Demonstration

.1 Demonstrate proper operation and maintenance procedures to City’s representative.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Corner guards.

.2 Sheet wall protection.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Samples:

.1 Submit 3 samples, 300 mm (12") long or 300 x 300 mm (12 x 12") in size as applicable, for each Material in specified finish.

.4 Shop drawings:

.1 Include plans, elevations, hardware, and installation details.

.2 Show seam locations.

.5 Templates:

.1 Submit templates to Contractor for use by installers and fabricators as required for proper location and installation of hardware.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Quality Assurance

.1 Mock-up:

.1 Provide full mock-up of each of the following types of wall protection specified in location as designated by Contract Administrator.

.1 Corner guards.

.2 Sheet wall protection.

.2 Mock-up may be incorporated in the completed work upon acceptance of Contract Administrator.

1.4 Site Conditions

.1 Install materials of this section only when surfaces and air temperatures have been maintained between 18°C and 24°C for 48 hours preceding installation, and will be so maintained during installation and for 48 hours thereafter. Maintain a minimum temperature of 13°C after above period. Relative humidity shall be 50% +/- 10%.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 General

.1 Incorporate reinforcing, fastenings and anchorage required for building-in of Materials.

2.3 Stainless Steel Corner Guard (CG)

.1 Material: Stainless steel.

.2 Finish: #4 satin finish.

.3 Angle: 90 degrees.

.4 Leg length: 89 mm (3-1/2").

.5 Mounting method: mechanically fastened.

.1 Fasteners: in accordance with corner guard manufacturer's written requirements.

.6 Acceptable Materials:

.1 C/S Construction Specialties 'CO-8'.

.2 InPro ‘Surface Mount Stainless Steel Corner Guard’.

.3 Substitutions: in accordance with Section 01 25 00.

2.4 Sheet Wall Protection (WP1)

.1 Vinyl/acrylic rigid sheet, high impact wall panel.

.1 Acceptable Materials:

.1 Inpro ‘Palladium Rigid Sheet’.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Thickness: Refer to Material Schedule.

.3 Colour and finish:

.1 Allow for 6 colours to later selection by Contract Administrator from manufacturer’s full range.

.4 Fire performance:

.1 Flame spread: 25 in accordance with CAN/ULC-S102-10.

.5 Accessories:

.1 Trims: Panel manufacturer's standard length extruded vinyl pieces for inside and outside corners and top caps; longest length possible to eliminate end joints, colour to match panels.

.2 Manufacturer's standard adhesive and mounting hardware.

.3 Sealant: in accordance with Section 07 92 00.

PART 3 - EXECUTION

3.1 Installation

.1 Install work to meet manufacturer's written requirements, true, tightly fitted, and level or flush to adjacent surfaces, as suitable for installation.

.2 Clean substrates to remove dirt, debris and loose particles prior to installation.

.3 Fit joints and junction between components tightly and in true planes.

.4 Install units on solid backing as indicated, and erect with materials and components straight, tight and in alignment.

.5 Corner guards:

.1 Corner guard edges shall be smooth.

.2 Mechanically fasten corner guards in accordance with guard manufacturer's written requirements. Fasteners shall be aligned and equally spaced.

.3 Visible fasteners are not permitted.

.4 Install corner guard shall be tightly fitted without gaps.

.6 Sheet wall protection:

.1 Install sheet wall protection and trims in accordance with sheet manufacturer's written recommendations. Butt joint panels with colour matched sealant.

.2 Provide required cut-outs for electrical outlets and wall penetrations.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Washroom accessories.

.2 Janitor room (custodial closet) accessories.

1.2 Administrative Requirements

.1 Coordination:

.1 Supply manufacturer's handling instructions, anchorage information, roughing-in dimensions, templates, and service requirements for installation of the work of this section, and assist or supervise, or both, the setting of anchorage devices and construction of other work incorporated with Materials specified in this section in order that they function as intended.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Samples:

.1 Submit 3 samples of each finish specified.

.4 Shop drawings:

.1 Include plans, elevations, hardware, and installation details.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Accessories

.1 Incorporate reinforcing, fastenings and anchorage required for building-in of Materials.

.2 Washroom accessories acceptable Materials; locations as indicated or scheduled:

.1 Toilet paper dispenser (WA1.1):

.1 Bobrick 'B-4288'.

.2 Grab bars:

.1 WA1.2, WA1.3, WA1.4; straight, dimensions as indicated on Drawings: Bobrick 'B-6806'.

.2 WA1.5; L-shaped: Bobrick 'B-5854'.

.3 WA1.6; L-shaped: Bobrick 'B-5898'.

.4 WA1.7; swing up: Frost '1055-W'.

.3 Toilet backrest (WA1.8):

.1 Frost '1028'.

.4 Paper towel dispenser (WA3.1):

.1 Bobrick 'B-9262'.

.5 Sanitary napkin waste receptacle (WA5.1):

.1 Bobrick 'B-270'.

.6 Waste receptor (WA5.2):

.1 Bobrick 'B-3644'.

.7 Combination paper towel dispenser and waste receptacle (WA5.3):

.1 Bobrick 'B-38034'.

.8 Floor standing waste receptacle (WA5.4):

.1 Bobrick 'B-2400'.

.9 Hand dryers, electric (WA7.1):

.1 Dyson 'Airblade V'.

.10 Hair dryers (WA7.2, WA7.3):

.1 World Dryer 'AirStyle Model B'.

.11 Sanitary napkin dispenser (WA8.1):

.1 Bobrick 'B-47069'.

.12 Soap dispenser, wall-mounted (WA9.1):

.1 Bobrick 'B-4112'.

.13 Soap dispenser, mirror-mounted (WA9.2):

.1 Bobrick 'B-2013'.

.14 Soap dispenser, shower (WA9.3):

.1 Bobrick 'B-26607'.

.15 Shower seat (WA10.1):

.1 Bobrick 'B-5192'.

.16 Recessed soap holder (WA10.2):

.1 Frost '1132-S'.

.17 Baby change station (WA11.1):

.1 Koala Kare 'KB 310-SSRE'.

.18 Adult change table, height adjustable (WA11.2):

.1 Koala Kare 'KB3000-AHL'.

.19 Shower rod (WA12.1):

.1 Bobrick 'B-6107'.

.20 Hook (WA13.1):

.1 Bobrick '76717'.

.21 Hook, collapsible (WA13.2):

.1 Bobrick 'B-983'.

.22 Utility shelf and mop holder (WA14.2):

.1 Bobrick 'B-239x34'.

.23 Universal changing room shelf (WA14.3):

.1 Bobrick 'B-295x16'.

.24 Mirror (WA17.1):

.1 Bobrick 'B-290 1836'.

.25 Mirror, full length (WA17.2):

.1 Bobrick 'B-290 2460.MBLK'.

.26 Substitutions: in accordance with Section 01 25 00.

.3 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

2.3 Fabrication

.1 Fabricate Materials with materials and component sizes, metal gauges, hardware, reinforcing, anchors, and fastenings of adequate strength to ensure that washroom accessories will remain free of warping, buckling, opening of joints and seams, and distortion within limits of intended use.

PART 3 - EXECUTION

3.1 Preparation

.1 Verify that rough-in dimensions and blocking or back-up has been provided to comply with Material manufacturer's written requirements.

3.2 Installation of Washroom and Janitor Accessories

.1 Comply with Material manufacturer's written requirements.

.2 Install and secure fixtures rigidly in place using expansion shields in solid masonry or concrete, toggle bolts in hollow masonry or sheet metal screws at metal studs.

.3 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.4 Install on built-in concealed solid backing materials. Grab bar installation shall be able to withstand 250 kg downward force.

.5 Verify locations and mounting heights with Contract Administrator before roughing-in.

3.3 Barrier Free Installation Heights

.1 Install accessories to permit operable parts and controls to be accessed in accordance with authorities having jurisdiction and the most recent version of the City of Winnipeg Accessibility Design Standard.

3.4 Installation Tolerances

.1 Install accessories plumb, level, straight, tight and secured, centred between joints on masonry and tile walls to the following maximum tolerances:

.1 Plumb and level: 3 mm (1/8").

.2 Variation from indicated position: 3 mm (1/8").

3.5 Adjusting and Cleaning

.1 Verify under work of this section that installed Materials function properly and adjust them accordingly to ensure satisfactory operation. Test mechanisms, hinges, locks, and latches and adjust and lubricate to ensure washroom accessories are in perfect working order.

.2 Do not remove protective coatings until final cleaning, or earlier if directed by Contract Administrator.

.3 Refinish damaged or defective work so that no variation in surface appearance is discernible. Refinish work at Site only if approved.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Prefinished stainless steel lockers; (LK1, LK2).

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Indicate thicknesses of metal, fabricating methods, assembled banks of lockers, bases, trim, numbering, filler panels, end panels, and tops.

.4 Samples:

.1 Submit sample of colour and finish on actual base metal.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 Lockers: stainless steel to CAN/CGSB 44.40-2001 AMEND.

.1 Types:

.1 LK1: Single tier locker.

.2 LK2: 2-tier locker.

.2 Size (width x depth x height): 305 mm x 457 mm x 1830 mm (12" x 18" x 72").

.3 Metal materials: Type 304, commercial grade stainless steel.

.1 Construction: All-welded.

.2 Frame: 1.6 mm thick (16 gauge).

.3 Door: 1.6 mm thick (16 gauge).

.4 Top, bottom, sides, backs, sides and tier dividers: 1.6 mm thick (16 gauge).

.5 Trim and filler panels: Concealed anchorage; 304 stainless steel, 20 gauge.

.4 Hooks: 2 single prong coat hooks, one on each side and one double ceiling hook.

.1 Hooks shall be no higher than:

.1 1700 mm above finished floor for single tier and upper tier lockers.

.2 1370 mm above finished floor for accessible single tier lockers.

.5 Ventilation: Airflow shall be achieved through louvers or perforates in the vertical frame members or door.

.6 Locking system: Hasp latch suitable for padlocks.

.7 Base: Built-up curb in accordance with Division 04.

.8 Number plates: Each door shall have a number plate riveted onto body or door pull, numbered sequentially starting at “1” for each locker type as directed by the Contract Administrator.

.9 Locker finish; exposed and semi-exposed surfaces: baked on polymer powder or alkyd enamel.

.1 Allow for 2 colours to later selection by the *Consultant*.

.2 Frame colour shall match door colour unless otherwise indicated.

.10 Acceptable Materials:

.1 Olympus Lockers & Storage Products ‘Standard Knocked-Down Corridor Locker’.

.2 Hadrian ‘Emperor Lockers’.

.3 Perfix ‘F70’.

.4 Substitutions: in accordance with Section 01 25 00.

PART 3 - EXECUTION

3.1 Installation

.1 Assemble and install lockers in accordance with manufacturer's written installation requirements.

.2 Securely fasten at least every third locker through to wall studs, masonry or concrete substrate.

.3 Install trim and filler panels where required for continuous appearance and where obstructions occur. Specific conditions as indicated.

.4 Install finished end panels to exposed ends of locker banks.

3.2 Installation Tolerances

.1 Install plumb, level, tight and secured. Comply with the following tolerances:

.1 Plumb and level: 3 mm (1/8").

.2 Variation from indicated position: plus/minus 3 mm (1/8").

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Solid phenolic lockers; (LK3, LK4, LK5).

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Indicate thicknesses of panels, fabricating methods, assembled banks of lockers, bases, trim, numbering, filler panels, end panels, and manufacturer's installation instructions.

.4 Samples:

.1 Submit sample of colour and finish.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 10 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 Lockers:

.1 Types:

.1 LK3: Single tier locker.

.2 LK4: 2-tier locker.

.3 LK5: Wallet locker banks, 6-tier and 4 units wide.

.2 Sizes:

.1 LK3, LK4: 305 mm wide x 457 mm deep x 1830 mm high (12" x 18" x 72").

.2 LK5: each locker to be 195 mm wide x 195 mm deep x 254 mm high.

.3 Solid phenolic:

.1 Solidly fused plastic laminate with matte-finish melamine surfaces, coloured face sheets, and black phenolic-resin core that is integrally bonded with exposed black edges milled and polished

.2 Thicknesses; solid phenolic panels:

.1 Doors and frames: 12.7 mm (1/2").

.2 Tops, bottoms, and shelves: 12.7 mm (1/2").

.3 Backs: 6 mm (1/4").

.4 Sides: 10 mm (3/8").

.5 Filler and end panels: 12.7 mm (1/2").

.3 Finish: rough matte finish.

.4 Colours: To later selection by Contract Administrator. from manufacturer's standard range.

.4 Locking system: Hasp latch suitable for padlocks.

.5 Hinges: constructed of stainless steel Type 304, provide 2 per door for multi-tier units and 3 for full height doors.

.1 Through-bolted hinges.

.2 Hinges tapped into door.

.6 Coat hooks: fabricated from metal or high impact plastic.

.1 2 prong, mounted to bottom of shelf, 1 per locker.

.2 Single prong side hooks, 2 per locker.

.1 Hooks shall be no higher than:

.1 1700 mm above finished floor for single tier and upper tier lockers.

.2 1370 mm above finished floor for accessible single tier lockers.

.7 Base:

.1 LK3, LK4: Manufacturer’s standard, 100 mm (4") high, fabricated from solid phenolic, colour to match lockers.

.8 Number plates: Each door shall have a number plate attached onto body or door pull, numbered sequentially starting at “1” for each locker Type as directed by the Contract Administrator.

.9 Acceptable Materials:

.1 Spectrum ‘Classic Locker’.

.2 EAD Design ‘Phenolic Lockers’.

.3 Substitutions: in accordance with Section 01 25 00.

PART 3 - EXECUTION

3.1 Installation

.1 Assemble and install lockers complete with bases in accordance with manufacturer's written installation requirements.

.2 Securely fasten at least every third locker through to wall studs, masonry or concrete substrate.

.3 Install trim and filler panels where required for continuous appearance and where obstructions occur. Specific conditions as indicated.

.4 Install finished end panels to exposed ends of locker banks.

3.2 Installation Tolerances

.1 Install plumb, level, tight and secured.

.2 Comply with the following maximum tolerances:

.1 Plumb and level: Maximum 3 mm (1/8").

.2 Variation from indicated position: plus/minus 3 mm (1/8").

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Custodial room shelving.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Shop drawings:

.1 Indicate shelving layouts, number of bays, number of shelves, system of bracing and anchoring devices.

.3 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Design Requirements

.1 Design shelving to accommodate vertical adjustment of shelves in 75 mm (3") increments and to permit easy assembly, expansion, dismantling and re-use of shelving component parts.

.2 Load capacity of floor to be verified.

2.3 Shelving

.1 Open type metal storage shelving system.

.1 Acceptable Materials:

.1 Global Industrial ‘Commercial Duty Open Steel Shelving’.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Dimensions: 1220 mm wide x 610 mm deep x 1905 mm high.

.3 Shelf capacity: minimum 136 kg (300 lbs).

2.4 Components

.1 Uprights: 1.9 mm (0.07") (14 gauge) roll formed steel angles with perforations to accommodate shelves and other components.

.2 Shelves: 0.91 mm (0.04") (20 gauge) brake formed sheet metal, double flanged perimeters.

.3 Gusset plates; for open shelving: 1.2 mm (0.05") (18 gauge) metal plates to reinforce corner connections of shelving components, four per unit.

.4 Fasteners: 6 mm (1/4") plated machine bolts and nuts.

2.5 Finish

.1 Finish shelving system in standard colour as selected by Contract Administrator.

.2 Manufacturers or brand names on face of units are not acceptable.

PART 3 - EXECUTION

3.1 Installation

.1 Do metal storage shelving Work in accordance with CGSB 44-GP-7-70 except where specified otherwise.

.2 Install metal storage shelving in accordance with reviewed layout.

.3 Brace, secure and anchor shelving units in place to prevent toppling.

.4 Make good baked enamel surfaces damaged during shipment or installation.

.5 Frames to be fixed to floor with anchor bolts.

.6 Frames to be levelled with shims. Maximum tolerance from the vertical is 12.7 mm (1/2") in 3000 mm (10'-0") of height.

.7 Beam connections complete with safety clips.

.8 Post signs indicating maximum permissible loads.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Convex mirrors (MIR2).

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Clearly indicate locations of mirrors in plan, elevations with installation heights, hardware, and installation details.

.4 Templates:

.1 Submit templates to Contractor for use by installers and fabricators as required for proper location and installation of hardware.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 Convex mirrors; interior grade (MIR2):

.1 Full dome acrylic convex mirror, located where indicated, complete with installation hardware.

.2 Acceptable Material:

.1 Security Mirror Industries Limited '360° Dome Mirror'.

.2 Substitutions: in accordance with Section 01 25 00.

PART 3 - EXECUTION

3.1 Installation

.1 Install mirror assemblies in accordance with manufacturer's written requirements.

.2 Submit manufacturer's information and templates required for installation of work of this section, and assist or supervise, or both, the setting of anchorage devices, and construction of other work incorporated with Materials specified in this section in order that they function as intended.

.3 Provide reinforcing, anchorage and mounting devices required for the installation Material.

.4 Install work tightly fitted and secure.

.5 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

3.2 Adjusting and Cleaning

.1 Verify under work of this section that installed Materials function properly, and adjust them accordingly to ensure satisfactory operation.

.2 Do not remove protective coatings until final cleaning in accordance with Section 01 74 00, or earlier if directed by Contract Administrator.

.3 Refinish damaged or defective work so that no variation in surface appearance is discernible. Refinish work at Site only if approved.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Optical turnstiles.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.2 Submit manufacturers' installation instructions.

.3 Shop drawings:

.1 Layout of equipment, mounting bolt locations, electric power requirements, and installation details, wiring diagrams, conduit runs and control wiring.

.2 Submit markings and designs of messages on signs, and notices to Contract Administrator for review.

.4 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

1.4 Quality Assurance

.1 Qualifications:

.1 Manufacturers:

.1 Company specializing in manufacturing Materials specified in this section, with 10 years' experience, minimum.

.2 Installers:

.1 Has adequate equipment and skilled workers to perform the work expeditiously.

.2 Has successfully completed installations similar to that specified during a period of at least the immediate past 5 years.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 5 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Pedestrian Control System

.1 Description:

.1 Two adjacent pedestals providing a dual swinging barrier utilizing pulsed infrared beams to monitor the passageway.

.2 Acceptable Material:

.1 Automatic Systems 'SlimLane Security Entrance Lane 940-950'.

.2 Substitutions: in accordance with Section 01 25 00.

2.3 Construction

.1 Frame: brushed 16 gauge (1.5 mm) thick stainless-steel type AISI 304L.

.1 Self-supporting kinematic frame: 5 mm (3/16") thick steel type S355 or equivalent.

.2 Side panels: brushed 1.5 mm (16 gauge) thick stainless-steel type AISI 304L.

.3 Top cover: brushed stainless-steel type AISI 304L.

.4 Swing obstacles: Tempered glass 9.5 mm (3/8") thick, clear.

.5 Enclosure: IP 40 degree of protection

2.4 Operation

.1 The unit must be automatically operated in both directions.

.2 Normal Operation (available for “Normally Closed & Controlled” configurations):

.1 In the stand-by position, the passageway must be securely blocked by means of double swing doors.

.2 Upon receipt of an opening pulse from the access control system, the obstacles must pivot in the direction of the passage into the lane, consequently freeing the passageway.

.3 The obstacles immediately close after passage or after a configurable delay.

.4 If an unauthorized person follows an authorized person (tailgating) or attempts to enter from the opposite direction, the unit must detect the unauthorized passage and activate the alarm conditions.

.3 Emergency Operation:

.1 The unit must have an input in order to receive the “fire alarm” signal. When the emergency signal is activated, the unit must react in the following way:

.1 Obstacles automatically open in the direction of egress and remain open.

.2 Green signals are displayed on the pictograms in both directions.

.2 This operating mode continues as long as the emergency signal is active. After the emergency signal has been turned off, the unit must return to its previous operating mode.

.4 Power Failure:

.1 In case of power failure, the obstacles must automatically open , powered by a supercapacitor circuit board, and be blocked open in the direction of egress.

.2 After the power supply has been restored, the unit must return to its previous operating mode.

2.5 Security

.1 Provide two (2) swinging glass obstacles for immediate lane closure.

.1 Height: 1830 mm (72”).

.2 The unit must have an integrated electromechanical lock; the obstacles must be locked in case of an attempted break-in.

.3 Passage must be electronically controlled in both directions to detect and deter unauthorized persons entering into the secure zone:

.1 Passage with an unauthorized means of authentication.

.2 Passage in the opposite direction.

.3 Unauthorized person following an authorized person, i.e. tailgating.

.4 Obstruction of an infrared beam path.

.4 The security entrance lane must ensure that one valid authentication allows only one valid entry to the restricted area by using infrared sensors to determine the direction of the passage and number of pedestrians passing through the passageway at one time.

.5 Passage must be electronically controlled in both directions by a high-density matrix of at least 40 sensors:

.1 Each sensor must be composed of a separate transmitter and receiver, no reflectors must be used.

.2 Sensors must be deployed in a matrix configuration made up of criss-cross beams, such that each optical receiver must detect the beams from several optical transmitters; the optical detection matrix must offer at least 96 detection beams.

.3 Detection beams must be controlled by an algorithm capable of tracking the user's passage in the lane from entry to exit point, anticipating position in the lane at each moment, as well as determining anything that may cause interference, obstruct, or fall into the lane passage that is not a security threat.

.6 In the event of detection of unauthorized behavior, the unit must close the swing obstacles and activate the alarm conditions.

2.6 Safety

.1 The unit must withstand at least 1700 N (380 lbs) of direct force applied on each side of the handrail, when respecting recommended installation requirements.

.2 It must be designed to avoid entrapment and prevent pinching points with a safety clearance of at least 25 mm (1") between the handrail and the swinging obstacles.

.3 It must be designed to operate in "EGRESS" operating mode:

.1 "EGRESS" operating mode: Powered and in an emergency, the obstacles can be unlocked by a simple push and open automatically in the direction of the evacuation (direction B - exit), but unable to open from unsecure side (direction A).

.1 Manual opening force for automatic swing obstacles must not exceed 222 N (50 lbs).

.2 Audio and visual alarms notify both security personnel and users of the evacuation in process.

.3 At the end of a configurable delay, the obstacles close automatically, and the unit resumes previous operating mode.

.4 The obstacles are electromechanically locked in case of a forced entry attempt in direction A (entry).

.4 When combined with a fire alarm system, the obstacles must open automatically in the direction of egress to free the passage when a fire alarm occurs, and the emergency signal is active.

.5 Provide user safety sensors to prevent obstacles from closing when a user is standing between the obstacles.

.6 It must be equipped with additional safety sensors ensuring enhanced user protection and luggage protection in entry and exit directions.

.7 It must be equipped with position sensors to control the position of the mobile obstacles with high precision and be able to stop obstacles movement when an obstruction is detected.

.8 Operating force of the swing obstacles: limited and comply with limitations of obstacle force Subject UL 2593 Outline for investigation and CAN/CSA C22.2 no. 247-92 (R2008). Obstacles shall require a force of not more than 66 N (13.8 lbs) to stop obstacle movement.

2.7 Pedestrian Guidance

.1 Visual notification with clear graphics must be incorporated into each passageway (one for each direction) to provide status of the lane, to control flow and to warn users.

.2 Must integrate an additional visual notification into each passageway (one for each direction) for indication of valid authentication or unauthorized behavior, to improve user guidance.

.3 Audible notification: incorporated into each passageway to provide status of the lane and alarm conditions with two (2) distinctive audible tones:

.1 First stage notifies user and security guard that someone has entered the lane without authorization:

.1 Allows user to attempt authorization, before going into a full alarm,

.2 Security guard is notified that a lane violation may occur.

.2 Second stage notifies user and security guard that someone has passed through the lane without authorization:

.1 Notifies the users that they have passed through the lane without authorization,

.2 Security guard is notified that a lane violation has occurred and takes appropriate actions.

2.8 Drive Unit

.1 Unit motor assembly: DC permanent magnet motor with epicyclical gearbox ensuring fast movement of the obstacles.

.2 Includes a controller ensuring progressive accelerations and gradual decelerations, for safe movement without vibrations.

.3 Includes a magnetic sensor to control the position and the speed of the mobile obstacles with high precision.

.4 The drive unit must be silent; the noise level generated from the unit must not exceed 55dB (measured at 914 mm (36”) from the motor assembly).

2.9 Controller

.1 The controller must have equipment diagnostic capability and the ability to be configured:

.1 Web based diagnostic software embedded in the controller.

.2 Communication between the diagnostic software and a device: 10/100Base-T Ethernet.

.3 Embedded diagnostic software: accessible by a web browser from any device.

.4 Diagnostic software with the following features:

.1 Real time monitoring of the lane.

.2 Operating modes and advanced parameter settings.

.3 Quick detection of the source of the problem and trouble notification with the unit.

.2 The equipment must have the ability to be controlled through a web-based monitoring software (supplied separately by the manufacturer), with the following features:

.1 Web-based monitoring software.

.2 Communication between the monitoring software and the security entrance lane: 10/100Base-T Ethernet.

.3 Monitoring software: accessible by a web browser from any device.

.4 Monitoring software with the following features:

.1 Able to control all installed units.

.2 Able to change the operating mode of the units.

.3 Show the status of the units (in service, fraud, technical error, etc.).

.4 Have a scheduler.

.5 Have an events log.

.6 Provide usage statistics.

2.10 Power Supply

.1 Power supply: 120 Volts.

.2 Unit's power rating:

.1 At rest: 40 W maximum.

.2 Normal: 300 W maximum.

.3 Peak: 480 W maximum.

2.11 PERFORMANCE

.1 Obstacles opening and closing time:

.1 The opening and closing time of the obstacles must not exceed 1.0 second for SLIM 940 units.

.2 The closing time of the obstacles shall take not less than 1.2 seconds for SLIM 950 units.

.2 Operating Temperatures: 0° to 50°C (32° to 122°F).

.3 MCBF (Mean Cycles Between Failures): 10 000 000 cycles.

2.12 Optional Equipment

.1 Customized glass obstacles with pattern or logo.

.2 Laminated glass obstacles.

.3 Manual control panel.

.4 Emergency push button.

.5 Flangeless end posts.

.6 Reader integration within housing.

.7 Barcode reader assembly.

PART 3- EXECUTION

3.1 Examination

.1 Finished floor substrate shall be level in accordance with equipment manufacturer's written requirements.

.2 Notify Contract Administrator in writing of conditions, which would be detrimental to installation. Commencement of work implies acceptance of previously completed work

3.2 Electrical

.1 Supply of electrical power to terminal box in each unit is specified in Divisions 26, 27, and 28.

.2 Conduit, wiring and electrical power supply to control system components and card reader system shall be under work of Divisions 26, 27, and 28.

.3 Provide other electrical wiring, conduit junction boxes, transformers, circuit breakers and auxiliary components required for complete installation. Conform to CSA and authorities have jurisdiction.

3.3 Installation

.1 Installation of system in accordance with equipment manufacturer's written requirements.

.2 Locate equipment where indicated and in accordance with reviewed shop drawings.

.3 Test and adjust complete system for proper function and leave in perfect working order.

3.4 Adjusting and Cleaning

.1 Verify that installed equipment functions properly, and adjust it accordingly to ensure satisfactory operation.

.2 Refinish damaged or defective work so that no variation in surface appearance is discernible.

3.5 Demonstration and Training

.1 Conduct demonstration and training in accordance with Section 01 79 00.

.2 Demonstration

.1 Before acceptance of system, arrange for demonstration of equipment with authorized representatives of City, to be performed by competent representative of equipment manufacturer to assure proper function, operation and explanation. Give City's representative a minimum of 48 hours advance notice in writing of demonstration date.

.2 Conduct comprehensive demonstration for City's staff on operation and care of pedestrian control system.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Fall arrest anchors.

.2 Horizontal lifelines.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit test data from qualified testing agency for structural compliance with standards.

.3 Shop drawings:

.1 Submit engineered shop drawings.

.2 Submit shop drawings, showing complete layout and configuration of system, locations, spacing, anchor heights, anchor waterproofing measures, and other components and accessories.

.3 Indicate design, layout, fabrication details, plans, design, elevations, hardware details, installation details and loads transmitted to structure.

.4 Submit detail drawings for anchor securement to structure, design details, plans, elevations and all accessories necessary for a complete and functional system.

.5 Shop drawings shall include design to meet the requirements of authorities having jurisdiction. This section shall be responsible for locations, quantity and type of anchors and work of this section. Drawings indicate diagrammatic and general information only.

.4 Proof of insurance:

.1 Submit proof of insurance (Materials and completed operations) for the engineering, design, and installation of components for work of this section and against failure.

.2 Proof of insurance shall identify insurer, policy number, policy term, and limit of liability, on duly signed letterhead and / or certificates of insurance.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

.3 Log book:

.1 Submit to the building City a maintenance log to be used for annual inspections.

.4 As-builts:

.1 Submit 2 copies of as-built drawings upon completion of work to serve as roof sketch. Encase each drawing for each location in clear hard plastic. Mount to wall at required locations.

.1 Provide wall-mounted encased drawings at the following locations:

.1 Roof access doors and hatches to each roof area.

.2 Level 1 administrative offices.

1.5 Quality Assurance

.1 Qualifications:

.1 Execute the work of this section using workers skilled in the respective duties for which they are employed, and with minimum 5 years' experience in application of Materials, systems, and assemblies specified.

.2 Manufacturers:

.1 Specialized in designing and manufacturing Materials specified in this section. Required 5 years documented experience and minimum $4,000,000 products and completed operations insurance covering design, fabrication, installation, and failure of Materials and systems covered under the work of Section 11 24 00.

.3 Engineer responsible for preparation of the shop drawings:

.1 In accordance with Section 01 33 00 except that the engineer shall have in force professional liability insurance with minimum coverage limit of $5,000,000 per claim and annual aggregate.

.4 Testing agencies:

.1 Experienced with proven record of 5 years of testing fall arrest and safety anchors and a professional engineer meeting qualifications required for professional engineers preparing shop drawings in accordance with Section 01 33 00.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

PART 2 - PRODUCTS

2.1 Manufacturers

.1 Acceptable Manufacturers:

.1 Ankor Exterior Access Corporation.

.2 Pro-Bel Enterprises Limited.

.3 Thaler Metal Industries Ltd.

2.2 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.3 Performance Requirements

.1 Design, fabricate, and install work of this section to allow the execution of work in accordance with the building code and the requirements of authorities having jurisdiction. Work of this section shall be interfaced with building envelope assemblies to maintain continuous water protection of the building envelope.

.2 Design system to achieve required attachment compatible with standard window washing practices and equipment.

.3 Locations and quantities indicated in the Contract Documents are schematic only and do not purport to identify or solve the specified performance criteria that the work of this section is required to meet or surpass.

.4 Final design, including locations and quantities are part of the work and responsibility of this section.

.5 Coordination is required with the work of related sections to ensure that allowances are made therein for the final design of the work of this section.

.6 Systems located at roof assemblies shall be watertight to a line 50 mm (2") above highest point of water scuppers or to heights of other drainage measures, whichever is greater, to prevent water intrusion into anchor systems and building. Alternatively, design anchors to be water-tight in fully immersed state, without requirements for periodic water-tightness inspections by City during the life of roofing system.

.7 Systems shall be tested by accredited laboratory to confirm conformance to regulatory and design requirements.

.8 Structural eyes shall be minimum 200 mm (8") above roofing.

.9 Materials shall be sourced from one manufacturer unless otherwise specified.

2.4 Fall Arrest Anchors - Exterior Applications

.1 Roof anchor materials; wall and roof mounted:

.1 Eye ring: Forged from Type 304 stainless steel.

.2 Bolts/washers/nuts: Type 304 stainless steel.

.3 Upstand/baseplate: HSS welded to base plate and hot dip galvanized.

.2 Anchors shall be designed and engineered to support 360° maximum working load.

.3 When steel piers are used instead of concrete piers, steel for pier to be hot dipped galvanized and pier to be filled with urethane foam insulation.

.4 Where anchors are penetrating insulation, provide thermally broken pads.

.5 Roof flashing; for steel pier anchors:

.1 Base flashing: Seamless spun aluminum flashing (for steel pier anchors): Type 6061-T6 alloy to ASTM B221-21 with deck flange flashed in to roofing membrane assembly.

.2 Cap flashing: Seal top with detachable watertight stainless steel cap flashing.

2.5 Horizontal Lifeline System

.1 Cable: Type 316 stainless steel cable complete with permanently swedged cable ends.

.2 Data plate: cable system entry points to be equipped with prominently displayed, non-corrosive data plate clearly stating maximum service capacity and number of users.

.3 Standard intermediate support brackets: multi-position, Type 316 stainless steel with reinforcing end caps and suitable for installation at height to suit required position. Secured using 13 mm (1/2") diameter fasteners.

.4 Mobile intermediate support brackets: multi-position, Type 316 stainless steel for working both sides of sloped roof at ridge point.

.5 Corner units: manufacturer’s standard flexible corner units, as required.

.6 End terminal hardware: stainless steel swedged termination at one end, and stainless steel tensioner with shock absorber at other end.

.7 Lanyard cable runner: Type 316 stainless steel with automatic runner bypass for continuous hands-free operation that can be inserted or removed anywhere on the cable.

.8 Harness: manufacturer's standard hands-free full body harness and lanyard complete with shock absorber.

.9 Flashing:

.1 Base flashing: Seamless spun aluminum flashing (for steel pier anchors): Type 6061-T6 alloy to ASTM B221-21 with deck flange flashed in to roofing membrane assembly.

.2 Cap flashing: Seal top of aluminum flashing with detachable watertight stainless steel cap flashing.

2.6 Isolation Coating

.1 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

PART 3 - EXECUTION

3.1 Examination

.1 Examine structural, deck and roofing conditions and proceed with work in accordance with Section 01 45 00.

.2 Examine structure, decking and roofing in the area of the installation and notify the Contract Administrator of any adverse conditions which could jeopardize the systems installation or the future performance of the roofing assembly. Do not proceed until such conditions have been documented, assessed, rectified and approved for the anchor installation. Starting work indicates acceptance of conditions unless Contract Administrator is notified otherwise in writing.

3.2 Installation

.1 Install work of this section under the supervision of a qualified professional engineer registered in Site.

.2 Fabricate and erect work true to dimensions, square, plumb, level and free from distortion or defects detrimental to appearance and performance.

.3 Include anchorage and mounting devices required for the installation.

.4 Surplus welding material shall be ground off and exposed internal and external corners shall have sharp lines. Remove grind marks on exposed surfaces.

.5 Where fastenings or anchors are required to be built in by other trades, supply with necessary templates, instructions and supervision to verify proper installation. Supply metal anchoring devices.

.6 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.7 Install anchor system in accordance with manufacturers written requirements, reviewed shop drawings and as specified herein.

.8 Following acceptance of the anchor installation and roof flashings by the Contract Administrator, deform the thread ends of anchor studs where threaded studs have been used.

.9 Seal between assemblies and adjacent materials to ensure watertight installations in accordance with Division 7.

.10 Clean and touch-up steel surfaces with zinc rich primer where burned by field welding or where damaged.

3.3 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00 and as follows:

.1 Independent inspection and testing company shall perform inspections and provide inspection reports.

.2 Submit proof load testing report verifying performance of roof anchors, in accordance with CAN/CSA-Z271-11.

.2 Manufacturer's field review to be in accordance with Section 01 45 00.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Basketball equipment.

.2 Volleyball equipment.

.3 Badminton equipment.

.4 Pickleball equipment.

.5 Ballet barres.

.6 Wall pads.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer’s Material data sheets for Materials and equipment proposed for use in the work of this section.

.2 Design data:

.1 Basketball backstops:

.1 Submit manufacturer's design data, indicating static loads and point reactions.

.2 Submit calculations complete, showing hanger and hoist pulley points.

.3 General load charts or generic product laboratory test data will not be considered sufficient data.

.3 Shop drawings:

.1 Submit engineered shop drawings.

.2 Clearly indicate fabrication details, plans, elevations, hardware, and installation details.

.4 Samples:

.1 Submit duplicate samples of each finish specified.

.5 Templates:

.1 Submit templates to Contractor for use by installers and fabricators as required for proper location and installation of hardware.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Basketball Equipment

.1 Backstop supports, forward folding, rear-braced, mounted to structure above:

.1 Acceptable Materials:

.1 Forum Athletic Products 'F850'.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Quantity: 6.

.3 Framing colour: to later selection by Contract Administrator from manufacturer's standard range.

.2 Backboards: Rectangular shaped, glass:

.1 Acceptable Materials:

.1 Forum Athletic Products 'F40209'.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Goals: Breakaway style.

.1 Acceptable Materials:

.1 Forum Athletic Products 'F40115'.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Cushion edge padding in colour to later selection by Contract Administrator from manufacturer's standard range.

.4 Height adjuster:

.1 Acceptable Materials:

.1 Forum Athletic Products 'F49004'.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Backstop operation:

.1 Backstop shall be provided with heavy duty, fully enclosed 3/4 HP electric winch, designed to hold unit at any position when raising or lowering backstop.

.2 Hoist cable shall be 6 mm (1/4") diameter galvanized aircraft cable with 3175 kg (7,000 lb) ultimate breaking strength.

.3 Operation: Key switch.

.4 Metal parts shall be painted with one coat of black enamel.

.5 Provide backstop safety strap.

2.3 Volleyball, Badminton and Pickleball Equipment

.1 Badminton/pickleball end posts:

.1 Quantity: 16 pairs.

.2 Acceptable Materials:

.1 Forum Athletic Products 'F50111 Badminton/Pickleball End Post 48 mm (1-7/8")', round.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Nets: For each pair of posts, provide one each standard regulation pickleball net, and badminton net.

.2 Volleyball end posts; competitive:

.1 Quantity: 8 pairs.

.2 Acceptable Materials:

.1 Post system: Forum Athletic Products 'F50501'.

.2 Competition net: Forum Athletic Products 'F50502'.

.3 Net antenna (pair): Forum Athletic Products 'F50503'.

.4 Post padding: Forum Athletic Products 'F50504'.

.5 Substitutions: in accordance with Section 01 25 00.

.3 Floor sleeves:

.1 Floor socket sleeve adapter, solid steel construction:

.1 Acceptable Materials:

.1 76 mm (3") inside diameter: Forum Athletic Products 'Model 'F50409'.

.2 48 mm (1-7/8") inside diameter: Forum Athletic Products 'Model 'F50407'.

.3 Substitutions: in accordance with Section 01 25 00.

.2 Locate sleeves as directed by Contract Administrator.

2.4 Ballet Barres

.1 Double height ballet barre, wall mounted:

.1 Colour: Black.

.2 Finish: Matte.

.3 Acceptable Materials:

.1 VITA Barre ‘Metro Double Wall Mount Ballet Barre Systems’.

.2 Substitutions: in accordance with Section 01 25 00.

.2 Fasteners: as recommended by manufacturer.

2.5 Wall Pads (WPNL)

.1 100 mm (4") thick, polyurethane core, with heavy vinyl shell.

.1 Acceptable manufacturers:

.1 Centaur Products Inc.

.2 Forum Athletic Products.

.3 Gymnasium & Health Equipment Ltd.

.4 Substitutions: in accordance with Section 01 25 00.

.2 Colour: to later selection by Contract Administrator from manufacturer’s standard range.

.2 Provide padding where indicated.

.3 Fabricate wall padding to sizes and configuration shown. If panel layout is not dimensioned, fabricate panels in largest practicable sizes, minimizing intermediate joints.

.4 Removable type padding shall be hook and loop fastened three sides with a double length of hook and loop fastener on side of mat responsible for securing mat to the wall. Hook and loop fasteners will allow individual mats to be attached together to provide a continuous mat of required length.

PART 3- EXECUTION

3.1 Installation

.1 Submit manufacturer's information and templates required for installation of work of this section, and assist or supervise, or both, the setting of anchorage devices, and construction of other Work incorporated with Materials specified in the work of this section in order that they function as intended.

.2 Include reinforcing, anchorage and mounting devices required for the installation of each Material.

.3 Install work to meet manufacturers' recommended specifications, true, tightly fitted, and level or flush to adjacent surfaces, as suitable for installation.

.4 Fit joints and junction between components tightly and in true planes, conceal and weld joints where possible.

3.2 Adjusting and Cleaning

.1 Verify under work of this section that installed Materials function properly, and adjust them accordingly to ensure satisfactory operation.

.2 Refinish damaged or defective work so that no variation in surface appearance is discernible.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Interior, electronic scoreboards, including controller.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data:

.1 Submit manufacturer's Material data for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Shop drawings shall indicate locations, face layout, dimensions, construction, electrical wiring diagrams, and method of anchorage.

.4 Samples:

.1 Submit samples of finishes.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

1.5 Quality Assurance

.1 Qualifications:

.1 Manufacturers:

.1 Company specializing in manufacturing the Materials specified in this section, with minimum 10 years experience.

.2 Applicators:

.1 Shall have 5 years' experience, minimum, in application of Materials and systems specified.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 5 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Scoreboards and other electrical components shall be certified for use in United States and Canada by Underwriters Laboratories Inc. (UL) and shall bear either the UL or cUL label, as applicable.

.2 Scoreboards shall be fabricated in compliance with CAN/CSA C22.2 No. 207-M89(R2013).

.3 Scoreboards and other electrical components shall be electrically grounded in accordance with National Electrical Code (NEC), Article 600.

2.3 Scoreboards - Multi-Purpose

.1 Type: Interior, multi-purpose electronic scoreboard with time, home score and team fouls, visitor score and team fouls, 2 bonus lights, 4 period lights and 2 possession arrows.

.1 Size: 3048 mm (120") long x 1220 mm (48") high x 152 mm (6") deep.

.2 Approximate hanging weight: 68 kg (150 lbs).

.3 LED digit size: 250 mm (10") and 178 mm (7").

.4 Provide manufacturer's standard wireless controller.

.5 Acceptable Materials:

.1 Daktronics 'BB-2125'.

.2 Subject to compliance with Contract Documents, acceptable equivalent Materials of following manufacturers may be used upon approval:

.1 Harris Time Inc.

.2 Nevco Scoreboard Company.

.3 Substitutions: in accordance with Section 01 25 00.

.2 Board colour: to later selection by Contract Administrator from manufacturer's standard range.

2.4 Accessories

.1 Provide each scoreboard or accessory with control cable of length indicated or required, junction boxes, mounting hardware, and other accessories as required for complete, functional installation.

.2 Controller:

.1 Type: Wireless, microprocessor based, operator's control centre with receiver unit mounted at scoreboard and shot clock, and designed to operate different models of scoreboard by interchange of keyboard overlay.

.2 Acceptable Materials:

.1 Daktronics 'All Sport 5000'.

.2 Subject to compliance with Contract Documents, acceptable equivalent Materials of following manufacturers may be used upon approval:

.1 Harris Time Inc.

.2 Nevco Scoreboard Company.

.3 Substitutions: in accordance with Section 01 25 00.

.3 Shot clock: wall mounted, controlled by wireless controller.

.1 Quantity: as indicated.

.2 Acceptable Materials:

.1 Daktronics 'BB-2114'.

.2 Subject to compliance with Contract Documents, acceptable equivalent Materials of following manufacturers may be used upon approval:

.1 Harris Time Inc.

.2 Nevco Scoreboard Company.

.3 Substitutions: in accordance with Section 01 25 00.

PART 3- EXECUTION

3.1 Examination

.1 Verify exact scoreboard and control centre junction box locations with Contract Administrator.

.2 Coordinate requirements for electrical power, wall blocking, auxiliary framing and supports, suspension cables, and other components to be provided under the work of other sections to ensure adequate provisions are made for complete, functional installation of the work of this section.

.3 Coordinate scoreboard electrical requirements to ensure proper power source, conduit, wiring, and boxes are provided. Prior to installation, verify type and location of power supply.

3.2 Installation

.1 Install scoreboards and accessories in accordance with manufacturer's requirements and recommendations.

.2 Before installation, field test scoreboards and accessories for operating functions. Ensure that scoreboards accurately perform all operations and correct deficiencies prior to installation.

.3 Rigidly mount scoreboards and accessories plumb and level with brackets and fasteners.

3.3 Electrical

.1 Supply of electrical power to terminal box in each unit is specified in Division 26.

.2 Conduit, wiring and electrical power supply to control centre system shall be work of Division 26.

.3 Supply and install electrical wiring, conduit junction boxes, transformers, circuit breakers and auxiliary components required for complete installation. Conform to CSA and authorities having jurisdiction.

3.4 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.2 Manufacturer's field review to be in accordance with Section 01 45 00.

3.5 Adjusting and Cleaning

.1 Clean exposed surfaces in accordance with manufacturer's recommendations.

3.6 Closeout Activities

.1 Conduct demonstration and training in accordance with Section 01 79 00.

.2 Demonstration:

.1 Conduct demonstration and training sessions covering operation and maintenance of scoreboards.

3.7 Protection

.1 Protect scoreboards and finishes until Substantial Performance.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Gymnasium curtain; motor operated.

.2 Mesh track surround.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials and equipment proposed for use in the work of this section.

.3 Shop drawings:

.1 Submit engineered shop drawings.

.2 Clearly indicate fabrication details, plans, elevations, hardware, support, curtain weight and installation details.

.4 Samples:

.1 Submit duplicate samples of each finish specified.

.5 Templates:

.1 Submit templates for use by installers and fabricators as required for proper location and installation of work of this section.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

1.4 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 5 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Gymnasium Curtain - Motorized Drop-Down

.1 Overhead suspension:

.1 Provide custom designed mounting clamps or clips to be supported to the building superstructure.

.2 Where positioning does not permit direct attachment to the building structure, provide support structure for mounting curtain system in accordance with Section 05 50 00.

.2 Drive system:

.1 One continuous 60 mm (2-3/8") diameter drive tube with electric drive unit located in the centre.

.2 Divider curtains shall be powered with a 3/4 HP drive unit.

.3 Hoisting mechanism:

.1 Drive tube: supported by roller assemblies fastened to building super structure.

.2 Cable lift drums: mounted on the drive tube per manufacturer's written requirements.

.3 Continuous curtain support tube: 25 mm (1"); suspended from the roller assemblies and fed through the top seam in the divider curtain; adjustable to obtain a level straight top-line and the proper clearance from the floor.

.4 Lift lines: 3 mm (1/8") 7 x 19 galvanized aircraft cable.

.1 Fasten lift lines to cable lift drums at the top.

.2 Securely fastened lift lines at the bottom ballast-tube through the curtain brailing grommets to the corresponding cable lift drums.

.5 Provide manufacturer's standard lock safety belt system attached to the hoisting mechanism.

.4 Operation: Electrically operated by wall-mounted key switch.

.1 Electric winch: 3/4 HP, 115 V, 11.5 A, instant reversible torque motor, limit switches, and flush mounted UP/DOWN/STOP constant contact single 3-position switch, 2300 inch pounds of torque, sealed gear case with precision ball bearings.

.5 Curtain:

.1 Fabric: Combination mesh/vinyl curtain with the lower 4500 mm (14'-9") of curtain being solid vinyl and top section open mesh.

.1 Solid vinyl: heavy duty 0.61 kg/sq.m (18 oz./sq. yd.) or [0.85 kg/sq.m (25 oz./sq.yd.) vinyl coated, heat set polyester material.

.2 Open mesh vinyl: 0.306 kg/sq.m (9 oz./sq. yd.) vinyl coated woven polyester fabric.

.2 All seams and hems to be heat sealed or sewn double with lock stitch.

.1 Seams: single turned 50 mm (2") seams.

.2 Hemmed edges: 152 mm (6") at sides and top, 254 mm (10") at bottom.

.1 Bottom hem to contain continuous ballast bar.

.3 Grommets: #4 stainless steel.

.4 Dimensions: as indicated.

.5 Curtain colour: to later selection by the Contract Administrator.

.6 Acceptable Materials:

.1 Centaur 'Electrafold Divider Curtain'.

.2 Substitutions: in accordance with Section 01 25 00.

2.3 Mesh Track Surround

.1 Fixed ceiling mounted mesh track surround, supported from guardrail pickets and roof joists above.

.2 Acceptable Materials:

.1 Reeden Net '#48 Nylon netting'.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Accessories, fasteners and suspension system: as recommended by manufacturer.

PART 3 - EXECUTION

3.1 Installation

.1 Submit manufacturer's information and templates required for installation of work of this section, and assist or supervise, or both, the setting of anchorage devices, and construction of other Work incorporated with Materials specified in the work of this section in order that they function as intended.

.2 Include reinforcing, anchorage and mounting devices required for the installation of each Material.

.3 Install work to meet manufacturers' specifications and installation requirements true, tightly fitted, and level or flush to adjacent surfaces, as suitable for installation.

.4 Fit joints and junction between components tightly and in true planes, conceal and weld joints where possible.

3.2 Adjusting and Cleaning

.1 Verify that installed Materials function properly, and adjust them accordingly to ensure satisfactory operation.

.2 Refinish damaged or defective work so that no variation in surface appearance is discernible.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Person lift and track system; ceiling-mounted.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.2 Submit equipment manufacturer's handling and installation instructions, anchorage information, roughing-in dimensions, service requirements for installation of the work of this section.

.3 Shop drawings:

.1 Submit engineered shop drawings for the following:

.1 Person lift and track system, and track support framing assemblies, including anchoring and connections for work of this section.

.2 Clearly indicate, materials, finishes, fabrication details, dimensions, thicknesses, plans, elevations, hardware, fastenings, and installation details.

.3 Indicate proposed site connections, fasteners and methods.

.4 Samples:

.1 Submit duplicate samples of each finish specified.

.5 Templates:

.1 Submit templates to Contractor for use by installers and fabricators as required for proper location and installation of equipment.

.2

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 5 years' experience, minimum, in the application of the Materials, systems, and assemblies specified.

.2 Manufacturer:

.1 Shall have 10 years of continued experience, minimum, having successfully completed other projects of similar or greater magnitude.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance / Design Requirements

.1 Person lift and track shall be in accordance with CSA Z10535.2:17 (R2022).

2.3 Person Lift and Track System (Ceiling-Mounted)

.1 Person Lift:

.1 Maximum load capacity: 272 kg (600lbs).

.2 Lifting height: up to 2134 mm (84”).

.3 2286 mm (7.5’) foot strap to allow vertical lift movement from floor.

.4 Vertical lift movement:

.1 Power operation:

.1 Battery powered; rechargeable.

.2 Batteries: Quick charge batteries, as recommended by lift manufacturer.

.3 Audible low battery indicator and visual battery/charge level display.

.4 Auto shut-off when not in use to conserve battery life.

.5 Emergency stop and emergency power lowering, with emergency manual raising or lowering.

.6 Hand control: Pneumatic hand control with programmable features.

.5 Traverse lift movement: Manual operation.

.6 Acceptable Materials:

.1 Guldmann ‘GH3’ ceiling lift system and track.

.2 Arjo ‘Maxi Sky 2’ ceiling lift system and track.

.2 Track: fixed track system as recommended by person lift manufacturer.

.1 Prefinished extruded aluminum track profile, including extruded aluminum ceiling brackets and white moulded styrene track end caps:

.1 Accurately formed, extruded aluminum alloy AA-6063-T6 to ANSI H35.1/H35.1M-2017 minimum, free from defects impairing appearance, strength and durability.

.2 Finish: Powder coat finish, white colour.

.2 Fastenings and connectors: Types as recommended by ceiling lift manufacturer.

.1 Prepainted fasteners, with finish/colour to match prefinished track for exposed locations.

.3 Provide framing and suspension system components as recommended by ceiling lift manufacturer, for a complete track system installation, compatible with and to suit finished ceiling assemblies.

.4 Track layout to provide patient access to all room amenities.

.5 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

.3 Sling:

.1 As recommended by manufacturer of person lift and track to suit maximum load capacity.

.2 Fabric: as selected by Contract Administrator from manufacturer’s standard range.

PART 3- EXECUTION

3.1 Installation - Person Lift

.1 Install equipment in accordance with equipment manufacturer’s written requirements and in accordance with reviewed shop drawings.

.2 Submit manufacturer's information and templates required for installation of work of this section. Assist or supervise, or both, the setting of anchorage devices, and construction of other work incorporated with Materials specified in work of this section in order that they function as intended.

.3 Include reinforcing, anchorage and mounting devices required for the installation of each Material.

.4 Verify locations and mounting heights with Contract Administrator before roughing-in.

.5 Electrical Subcontractor shall be responsible for final electrical hook-up at service connection locations. Coordinate work of this section with work of Divisions 26, 27, and 28.

3.2 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.2 Manufacturer’s field review to be in accordance with Section 01 45 00.

3.3 Adjusting and Cleaning

.1 Upon completion of installation, inspect finishes and materials for damage and faulty installation. Make good or replace damaged finishes and materials as directed by Contract Administrator at no cost to City.

.2 Verify under work of this section that installed Materials function properly, and adjust accordingly to ensure satisfactory operation.

.3 Do not remove protective coatings until final cleaning in accordance with Section 01 78 00, or earlier if directed by Contract Administrator.

3.4 Closeout Activities

.1 Testing:

.1 Test and commission equipment in accordance with equipment manufacturer’s written requirements.

.2 Demonstration:

.1 Before acceptance of system, arrange for demonstration of equipment with authorized representatives of City, to be performed by competent representative of equipment manufacturer to assure proper function, operation and explanation. Give City’s representative a minimum of 48 hours advance notice in writing of demonstration date.

.2 Conduct comprehensive demonstration for City’s staff on operation and care of equipment.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Roller window sun shades at interior locations, manual (RWS1).

.2 Roller window room darkening (black-out) shades at interior locations, motorized (RWS2).

.3 Roller window sun shades at interior locations, motorized, anti-glare (RWS3).

.4 Roller window room darkening (black-out) shades at interior locations, manual (RWS4).

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.2 Submit flammability performance data.

.3 Submit manufacturers' installation instructions.

.3 Shop drawings:

.1 Submit shop drawings or fully dimensioned catalogue cuts.

.2 Window treatment schedule: Use same designations indicated on Contract Documents.

.3 Clearly indicate general construction, configurations, jointing methods and locations, fastening methods, handing of controls, required blocking locations, banding (tandem shades), and installation details.

.4 Samples:

.1 Submit samples of each material and finish colour selected and each accessory.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

1.5 Quality Assurance

.1 Qualifications:

.1 Manufacturers:

.1 Company specializing in manufacturing the Materials specified in this section, with 10 years' experience minimum.

.2 Installers / applicators / erectors:

.1 Work of this section shall be by forces in the direct employ or under control of the system manufacturer, skilled, trained, and experienced in work of similar scope and complexity.

.2 Mock-ups:

.1 Erect 1 full size mock-up each roller shade type at the Site for review. Completed and accepted mock-up shall act as the standard to which balance of the work of this section will be judged.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 5 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Performance/Design Requirements

.1 Manual operation:

.1 Every part of a corded window covering that is accessible to a child and is small enough to be totally enclosed in a small parts cylinder in accordance with 'Corded Window Coverings Regulations - SOR/2019-97' must be affixed to the corded window covering so that the part does not become detached when it is subjected to a force of 90 N applied in any direction.

.2 Unreachable cords:

.1 A cord that is not reachable must remain so, whether the corded window covering is fully opened, fully closed or in any position in between, throughout the useful life of the corded window covering.

.3 Reachable cord with one free end; length:

.1 A reachable cord with one free end must not exceed 220 mm in length when it is pulled in any direction by the gradual application of force attaining 35 N.

.4 Reachable cord between two consecutive contact points; length:

.1 A reachable cord with no free end must not exceed 220 mm in length between two consecutive contact points when it is pulled in any direction by the gradual application of force attaining 35 N.

.5 Loop created by a reachable cord; perimeter:

.1 If a reachable cord is pulled in any direction by the gradual application of force attaining 35 N, the perimeter of any loop, whether it is existing, created or enlarged, must not exceed 440 mm.

.6 Two reachable cords:

.1 If two reachable cords with one free end each can be connected to one another, end to end, after each has been pulled in any direction by the gradual application of force attaining 35 N, the following criteria must be met:

.1 The length of the resulting cord must not exceed 220 mm.

.2 The perimeter of the loop that is created must not exceed 440 mm.

2.3 Roller Window Shade Systems

.1 Basis of design:

.1 RWS1: SunProtection Group Inc. 'Infinity FRS-85/105'.

.2 RWS2: SunProtection Group Inc. 'Infinity Moto-Roll FRS-85/105 Motorized'.

.3 RWS3: SunProtection Group Inc. 'XTR C-115-SZR' with 'Zip Shade Cassette'.

.4 RWS4: SunProtection Group Inc. 'Infinity FRS-85/105'.

2.4 Hardware - Manual Controlled Shades

.1 Shades shall be operated to permit infinite positioning. Left or right hand operation and banding as applicable to suit Site condition.

.1 Drive assembly:

.1 Allow finger tip control and include a built in shock absorber system to prevent cord breakage under normal operating conditions.

.2 Capable of being field adjusted from the exterior of the shade unit without having to disassemble the hardware.

.2 Control shades and room darkening shades independently.

2.5 Hardware - Motor Controlled Shades

.1 Electrical shade motors:

.1 Factory-assembled, shade-operator systems of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Motors to allow wireless radio control of window shades. Coordinate operator wiring requirements and electrical characteristics with building electrical system.

.2 Instantly reversible, adjustable limit switches, thermal overload protector, and electric brake.

.3 Torque limiter with self-adjusting shut-off.

.4 Equipped with externally located control wheels that allow exact control of shade limits in raised and lowered positions, preventing over winding of the fabric/shade cloth.

.2 Motor Control systems:

.1 Manual switch controls:

.1 Control group(s) of roller shades by one switch.

.2 Switch types:

.1 Rocker type switch, recess mounted, complete with cover plate as selected by Contract Administrator from standard manufacturer’s range.

.2 Remote control:

.1 Control zone(s) of roller shades consisting of more than one group by one hand held remote control providing following functions: master switch per zone, one switch per group.

.3 Sun sensor/weather control; microprocessor providing the following functions:

.1 Integration with building automation system in accordance with Section 23 09 00.

.2 Fully automated with an externally installed rain, wind, sun and temperature sensors.

.3 Solar control shall include:

.1 Summer and winter setting.

.2 Manual override switch.

.3 Program to automatically change the programmed microprocessor solar clock to the current date and time of sun rise and sun set at any latitude.

.4 An adjustable time delay to allow for fluctuations in measured solar value as obtained by the light.

.4 Timer control, shall include operating programs allowing roller shades to lower and raise to conserve energy and/or create privacy when required.

.5 Sun sensor and timer control shall have a display window indicating performance functions, day and time, summer or winter setting, measured solar value, manual or automatic mode, last movement and position of roller shade system, timer function activation and program activation.

.6 Processor shall be removable and remain energized and maintain current settings for re-programming by a qualified technician. In case of a power failure processor shall remain energized for a maximum period of 6 months and maintain current settings, re-programming will not be required.

.7 Each group of roller shades installed at the same elevation shall be controlled by a sensor and programmable timer, with automatic and manual operation mode.

.8 Zone of roller shades consisting of more than one group shall be configured to allow control per elevation by sensor and programmable timer, with automatic and manual operation mode.

.9 Building consisting of more than one zone and various groups shall be configured to allow control per elevation by sun sensor and programmable timer, with automatic and manual operation mode.

.10 Basis of design: Somfy ‘animeo IP System’.

.3 Control shades and room darkening shades independently.

2.6 Assembly

.1 Provide fully factory assembled shade unit consisting of 2 shade brackets, one piece extruded aluminum shade tube, extruded aluminum fascia, aluminum profile hembars, extruded vinyl fabric spline, and fabric as specified.

.2 Fabric shall hang straight, without shifting sideways more than 3 mm (1/8") in either direction due to warp distortion or weave design.

.3 Factory modify housings where necessary to bypass columns.

.4 End brackets: a two piece molded ABS construction with nylon drive sprocket. Bracket colour shall coordinate with the fascia colour.

.5 Shade tube: Minimum 1.52 mm (0.060") thick extruded aluminum with three equally spaced continuous stiffening fins, non-sag design, maximum deflection under full load of fabric L/700.

.6 Fascia: Minimum 1.5 mm (1/6") thick extruded aluminum.

.7 Hembar: Extruded aluminum with matching plastic end finials.

.8 Mounting: Removal of shade system shall not require the disassembly of the shade unit.

.9 Room darkening (black-out) shade features: 13 mm (1/2") pile mounted in prefinished 38 mm x 28 mm (1-1/2" x 1-1/8") extruded aluminum side and bottom channels finished to match mullions. Include dynamic hembar to allow for variance in window sill level.

2.7 Shade Mounting System

.1 Design extruded aluminum bracket to accept preassembled shade system.

.1 Use brackets to facilitate the alignment with shade opening.

.2 Modular construction: Shades shall be removable as a complete modular unit without any component disassembly required.

.3 Shade hardware system to allow for tandem operation.

2.8 Aluminum Finish

.1 Exposed aluminum: Baked enamel, colour to match window mullion finish.

.2 Unexposed aluminium: Mill finish.

2.9 Shade Fabric Types

.1 Sun control fabric; dimensionally stable PVC-free shade fabrics, with bacterial and fungal resistance:

.2 Acceptable Materials:

.1 RWS1, 0.5% open area:

.1 SunProtection Group Inc. 'Ecotex Comfort 9003-410'.

.2 RWS2, RWS4 blackout fabric:

.1 SunProtection Group Inc. 'Ecotex Moon 9012-13'

.3 RWS3, 0.5% open area:

.1 SunProtection Group Inc. 'Ecotex Comfort 9003-116'.

.4 Substitutions: in accordance with Section 01 25 00.

.3 Fabric:

.1 Hang flat, without buckling or distortion. Edge, where trimmed, shall hang true and straight, without shifting sideways more than 3 mm (1/8") in either direction due to warp distortion or weave design.

.2 Colour fast, retain its shape, and not be affected by moisture or heat.

.4 Flammability performance:

.1 Certified by an independent laboratory, shade fabric shall pass CAN/ULC S109-14.

2.10 Fabrication

.1 Finished assemblies: Square, true to size and free from distortion, twist, or other defects that could affect their strength, operation or appearance.

.2 Factory applied finish: Uniform, smooth and without blemishes.

PART 3 - EXECUTION

3.1 Installation

.1 Install shade systems in plumb, squared, adequately anchored, maintaining uniformed clearances, accurate alignment levels, and parallel with the window plane. Fabric shall not travel more than 3 mm (1/8") in either direction within channels after installation.

.2 Fabric shall be pre-measured and manufactured off-site.

.3 Shades shall be snapped into place without screws or visible fasteners.

.4 Incorporate reinforcing, fastening and anchorage required for installation of shades.

.5 Securely attach installation fittings to their mounting surfaces with stainless steel or hardened aluminum screws of proper length and type, and durable anchors.

.6 Install shade roller true and level, and with cloth to hang flat without buckling or distortion.

.7 Install room darkening shades (black-out), eliminating passage of light from exterior.

.8 Electrical wiring, hook-up, switches; motorized shades: in accordance with Divisions 26, 27, and 28.

.9 Building automation system integration: in accordance with Section 23 09 00.

3.2 Adjusting and Cleaning

.1 Verify that installed shade system functions properly, and adjust it accordingly to ensure satisfactory operation.

.2 Refinish damaged or defective work so that no variation in surface appearance is discernible.

3.3 Demonstration and Training

.1 Conduct demonstration and training in accordance with Section 01 79 00.

.2 Demonstration:

.1 Before acceptance of system, arrange for demonstration of equipment with authorized representatives of City, to be performed by representative of shade manufacturer to assure proper function, operation and explanation.

.2 Conduct comprehensive demonstration for City’s staff on operation and care of interior window treatments.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Entrance floor grilles (FLGR1).

1.2 Administrative Requirements

.1 Coordination:

.1 Coordinate top of grid surfaces with bottom of doors that swing across to provide ample clearance between door and grid.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Layout of floor grilles including grid and frame, direction of traffic, dimensions, fabrication details, splice locations, profiles, hardware, and accessories.

.4 Samples:

.1 Submit duplicate samples of each finish and each insert specified.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Entrance Floor Grilles (FLGR1)

.1 29 mm (1-1/8") Type 304 stainless steel with stainless steel angle frame.

.2 Accessories:

.1 Drain and stainless steel pan.

.2 Level base.

.3 Acceptable Materials:

.1 Construction Specialties Inc. 'GridLine G6'.

.2 Substitutions: in accordance with Section 01 25 00.

.4 Galvanic/dissimilar metal corrosion inhibitor (isolation coating): in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

2.3 Fabrication

.1 Fabricate products with materials and component sizes, metal gauges, hardware, reinforcing, anchors, and fastenings of adequate strength to ensure that foot grilles will remain free of warping, buckling, opening of joints and seams, and distortion within limits of intended use.

PART 3 - EXECUTION

3.1 Preparation

.1 Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

.1 Do not proceed until unsatisfactory conditions have been corrected.

3.2 Installation

.1 Install the work of this section in accordance with the manufacturer's written requirements.

.2 Mill finish frames in contact with concrete to be primer coated.

.3 Set grid type at height recommended by manufacturer for most effective cleaning action.

.4 Include reinforcing, anchorage and mounting devices required for the installation of each Material.

.5 Provide galvanic/dissimilar metal corrosion inhibitor (isolation coating) in accordance with Section 01 73 00 and written requirements of manufacturers of metals affected.

3.3 Adjusting and Cleaning

.1 Verify that installed Materials function properly, and adjust them accordingly to ensure satisfactory operation.

.2 Refinish damaged or defective work so that no variation in surface appearance is discernible.

END OF SECTION

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Bleachers.

.2 Courtside chairs.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Quality Assurance

.1 Qualifications:

.1 Manufacturers:

.1 Have been regularly engaged in the design and manufacturing of bleacher seating for not less than 10 years.

.2 Installers:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems and assemblies specified.

1.4 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Indicate bleacher system layout.

.2 Indicate seat heights, row spacing and rise, aisle widths and locations, assembly dimensions, anchorage to supporting structure, material types and finishes.

.3 Clearly indicate general construction, configurations, jointing methods and locations, fastening methods and installation details.

.4 Indicate location of blocking and reinforcement for bleacher system required in floor system.

.5 Include actual dimensions of the parts of the Work where bleachers are to be installed by accurate field measurements taken at the Site.

.4 Samples:

.1 Submit samples of each material and finish colour selected and each accessory for review.

.5 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.5 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

1.6 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.2 Duration: 2 years.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Bleachers

.1 Portable bleacher system capable of being stored in an upright position:

.1 Acceptable Materials:

.1 Sport Systems Canada 'Aluminum Tip & Roll Bleachers'.

.2 Substitutions: In accordance with Section 01 25 00.

.2 Dimensions:

.1 Size: 6400 mm (21'-0") long, 3 rows high.

.2 Rise per row: 191 mm (7-1/2”).

.3 Row to row spacing: 610 mm (24”).

.3 Quantity: as indicated on drawings.

.2 Aluminum:

.1 Aluminum extrusions: in accordance with ASTM B221-21, alloy 6063-T5 or T6 to ANSI H35.1/H35.1M-2017.

.2 Aluminum sheet: aluminum flat sheet in accordance with ASTM B209/B209M-21a, alloy 5005H14 to ANSI H35.1/H35.1M-2017. Exposed sheet shall be machine flattened free of distortions, resquared, sawcut edges.

.3 Wheels: non-marring soft rubber face swivel and locking casters with rounded edges designed to protect floor finish, recommended by bleacher manufacturer and sized to suit loads.

.4 Footpads: non-marring soft rubber, as recommended by bleacher manufacturer and sized to suit loads.

.5 Finishes:

.1 Understructure, cross bracing, risers and foot planks: mill finished aluminum.

.2 Seat planks: Clear anodized in accordance with AAMA 611-20.

2.3 Courtside Chairs

.1 Portable folding chairs with minimum 18 gauge galvanized steel frame, upholstered seat and back cushions, permanent armrests, and ganging brackets.

.1 Quantity: 56.

.2 Provide custom panel strip on 8 chairs for identification of accessible seating.

.2 Frame and vinyl fabric colour: to later selection by Contract Administrator from manufacturer’s standard range.

.3 Acceptable Materials:

.1 Spec Seats ‘DS100’.

.2 Substitutions: In accordance with Section 01 25 00.

.4 Storage cart:

.1 Steel framed cart on 4 casters, each with capacity of 318 kg (700 lbs).

.2 Chair capacity: 56.

.3 Acceptable Materials:

.1 Spec Seats ‘TS34’, model ‘AS100/ABS500’.

.2 Substitutions: In accordance with Section 01 25 00.

PART 3- EXECUTION

3.1 Examination

.1 Take measurements at the Site to verify that work of this section is fabricated to fit surrounding construction, and around obstructions and projections in place, or as indicated.

.2 Verify area to receive work of this section is free of impediments interfering with installation and substrates are acceptable to receive bleacher system in accordance with bleacher system manufacturer's recommendations. Do not commence installation until conditions are satisfactory.

3.2 Installation

.1 Install in accordance with manufacturer's written installation requirements.

.2 Assemble and erect work plumb, true, square, straight, level and accurate to sizes detailed, to reviewed shop drawings, free from distortion and defects detrimental to appearance and performance.

3.3 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

3.4 Adjusting and Cleaning

.1 Upon completion of work of this section, clean down material, lubricate and adjust operation as required to obtain optimum performance.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Bicycle racks.

.2 Bicycle repair station.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets:

.1 Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 Shop drawings:

.1 Clearly indicate fabrication details, plans, elevations, hardware, and installation details.

.4 Samples:

.1 Submit 2 samples of each finish specified.

.5 Templates:

.1 Submit templates to Contractor for use by installers and fabricators as required for proper location and installation of hardware.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 General

.1 Incorporate reinforcing, fastenings and anchorage required for building in of Materials.

2.3 Bicycle Racks

.1 Vertical bike racks; interior:

.1 Acceptable Materials:

.1 Saris 'Universal Bike Trac Vertical Bike Storage Solution' with lock bar.

.2 Substitutions: In accordance with Section 01 25 00.

2.4 Bicycle Repair Station

.1 Heavy gauge steel bicycle repair stand, including bicycle repair tools secured with aircraft cable, high pressure pump and bike hanger.

.2 Acceptable Materials:

.1 Greenspoke 'Freestanding Repair Station with Integrated Pump'.

.2 Substitutions: In accordance with Section 01 25 00.

.3 Finish: polyester powder coat, colour to later selection by Contract Administrator from manufacturer's standard range.

PART 3- EXECUTION

3.1 Installation

.1 Provide manufacturer's information and templates required for installation of work of this section, and assist or supervise, or both, the setting of anchorage devices, and construction of other work incorporated with products specified in this section in order that they function as intended.

.2 Install bike racks in accordance with manufacturer's written requirements, true, tightly fitted, and level or flush to adjacent surfaces, as suitable for installation.

.3 Include reinforcing, anchorage and mounting devices required for the installation of each product.

.4 Fit joints and junction between components tightly and in true planes, conceal and weld joints where possible.

3.2 Adjusting and Cleaning

.1 Verify under work of this section that installed Materials function properly, and adjust them accordingly to ensure satisfactory operation.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Electric MRL Traction Elevators.

1.2 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Shop drawings:

.1 Indicate seismic design, connections and restraint.

.2 Show the complete layout of the elevator equipment, location of machinery and apparatus, loads to be carried on building structure and design of elevator cab, hoistway entrances and signals. Submit layout to elevator authorities having jurisdiction before work proceeds. At the review of shop drawings, hoistway sizes and electrical current characteristics will be confirmed.

.3 Include on shop drawings:

.1 Complete elevations, ceiling plan, overall layout and details of the elevator car.

.2 Size and location of machine, controller and piping.

.3 Size and location of car, hoisting beam, guide rails, buffers and other components in hoistway.

.4 Rail bracket spacing and maximum loads on guide rails.

.5 Reactions at points of support.

.6 Weights of principal components.

.7 Top and bottom clearance and over travel of car.

.8 Location of circuit breaker, switchboard panel or disconnect switch, light switch and feeder extension points in machine room.

.9 Location for connection of travelling cables.

.10 Location and size of access doors.

.11 Loads on hoisting beams.

.12 Expected heat generation of equipment in machine room.

.13 Car and counterweight safeties.

.4 Include on general arrangement drawings:

.1 Type, size, location of hoistway entrances showing details of fastening to hoistway structure.

.3 Samples:

.1 Submit samples of materials which will be visible in the finish before fabrication in accordance with Section 01 33 00. Samples shall fully represent the physical and chemical properties of the materials to be supplied.

.4 Submit information regarding power requirements, ventilation, requirements, cut-outs, access requirements and lighting and outlet locations, within 2 weeks subsequent to Contract award.

.5 Submit a completion schedule showing equipment delivery dates, and anticipated completion date for each elevator.

.6 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.3 Closeout submittals:

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 As-Built Records

.1 Submit as-built records in accordance with Section 01 78 00.

.2 Record actual locations of equipment, names or equipment manufacturers and suppliers, concealed conduit and boxes, concealed devices, disconnects.

.3 Supply the City with as-builts drawings (elevator & mechanical) complete with maintenance and operating manuals, and tools, or devices (proprietary or otherwise) as required to maintain, service, and operate the elevators.

.3 Operation and Maintenance Data

.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00.

.2 Include description of elevator system's method of operation and control including motor, door operation, signals, and special or non-standard features provided.

.3 Provide parts catalogues with complete list of equipment replacement parts with equipment description and identifying numbers.

.4 Legible schematic of wiring diagrams covering electrical equipment installed, including changes made in final work, with symbols listed corresponding to identity or markings on both machine room and hoistway apparatus.

.5 Lubrication chart.

.6 Planned maintenance tasks and their frequencies.

.7 Maintenance of special finishes.

.8 Submit to the City any tools or devices that are required not only for basic operation and maintenance of the elevator, but also for troubleshooting or reprogramming. Include a user’s guide/reference manual that effectively communicates to a qualified mechanic how to use the controller and/or tool, and that also defines and explains all respective error codes, including required fixes. The devices, tools, and user’s manual so submitted shall be such as to allow any qualified maintenance service company to be able to provide proper maintenance services.

.4 Log Book: Provide maintenance log book for recording maintenance activities.

1.4 Quality Assurance

.1 Retain a Professional Engineer registered in the Site to design the work of this section; to prepare, seal and sign shop drawings; and to perform field review. Shop drawings shall show both design and installation requirements.

.2 Qualifications:

.1 Manufacturers:

.1 Elevators shall be manufactured by a firm with a minimum of 10 years of experience in fabrication of elevators equivalent to those specified.

.3 Installation: Elevators shall be installed by the manufacturer.

1.5 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Labour, materials, and workmanship for work of this section.

.1 Duration: 2 years.

1.6 Maintenance

.1 Provide maintenance services for a period of 1 year from date indicated for commencement of warranty period in Section 01 78 36.

.2 Maintenance service shall include call-back service between regular inspections and shall be available during the regular working hours and days without additional cost to the City including emergency service, which shall be provided on a 24-hour per day, 7 days a week basis, during the maintenance period. Include for release of trapped passengers or carrying out necessary repairs at no additional service charge.

.1 Response Time: One hour or less.

.3 Maintenance service shall include equipment servicing frequency of 1 service visit per month.

.4 Maintenance shall include the systematic examination, adjustment and lubrication of elevator equipment and apparatus and repair or replacement of the electrical and mechanical parts of the elevator equipment and apparatus. Repair equipment whenever this is required and use only genuine standard parts produced and manufactured for the equipment concerned.

.5 Replace wire ropes as often as necessary to maintain an adequate factor of safety.

.6 City reserves the right to reassign full service maintenance work to another qualified elevator maintenance company in the event a professionally qualified unbiased third party deems this Section to be deficient in the performance of its maintenance duties and has found this Section negligent in completing noted deficiency items within 30 days of receiving written notification of such deficiencies. Resulting and additional costs, as incurred by the City when maintenance services are re-assigned, shall be the responsibility of this Section.

.7 Renewals or repairs necessitated by reason of misuse, accidents or negligence not caused by this Section, except ordinary wear and tear, shall not be the responsibility of this Section.

.8 Supply necessary lubricants, cleaning materials and repair parts required to keep the installation in good working order during this maintenance period.

.9 Be able to show that the elevator manufacturer and installer has had successful experience in the complete maintenance of elevators and employs competent personnel to handle this service.

.10 Work under this maintenance provision shall be performed by personnel under the supervision and in the direct employ of the elevator manufacturer and installer.

.11 Provide maintenance and maintain on-site log book in accordance with the elevator code.

PART 2 - PRODUCTS

2.1 Manufacturers

.1 Basis of design:

.1 Kone ‘Monospace 300DX’.

.2 Substitutions: in accordance with Section 01 25 00.

2.2 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor’s LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor’s LEED coordinator with regard to IAQ management activities.

2.3 Regulatory Requirements

.1 Design and installation of elevator system shall comply with ASME A17.1-2007/ASME A17.1-2016/CSA B44-16 and applicable local codes.

.2 In all cases where a device or part of the equipment is herein referred to in the singular manner, it is intended that such reference shall apply to as many such devices as are required to complete the installation.

.3 Permits and Inspections:

.1 Obtain and pay for necessary provincial inspection and permit, except operation or ownership permits and make such tests as called for by the regulations of such authorities. These tests shall be made in the presence of the authorized representatives of such authorities.

.2 Be responsible in respect of permits, moneys and dues to be paid due to the trade unions having jurisdiction in regard of the use of elevators during the construction of the project.

.4 Elevating license:

.1 Elevating license:

.1 Provide and pay for elevating licenses on behalf of City for first year of operation.

.2 Be registered with the safety authority having jurisdiction at the Site.

.3 Provide equipment according to seismic zone.

2.4 Operating Performance

.1 Levelling Tolerance (stopping accuracy): Adjust to within 5 mm (0.2 in.) of floor finish level under rated loading to zero loading conditions and both directions of travel.

.2 Ride quality - Arrange that the lateral acceleration (front to rear and side to side) measured during express runs is less than:

.1 Vertical Vibration (maximum): 15 milli-g.

.2 Horizontal Vibration (maximum): 12 milli-g.

.3 Jerk (maximum): 0.3 m/sec2.

.3 Performance

.1 Car speed: within 3% of contract speed under full range of loading conditions and direction of travel.

.2 Car capacity: Safely lower, stop and hold up to 125% of rated load. (code required).

2.5 Non-Proprietary Elevator Equipment and Maintenance Provisions

.1 Elevator control equipment shall be non-proprietary, or provided with site-specific service tools to render the control equipment non-proprietary.

.2 Controller interface/service tools shall allow full access to fault codes and maintenance related parameters, with no time limits, and shall allow adjustments, monitoring, and repairs to be performed by any licensed and qualified elevator service provider.

.3 Controller and/or site-specific service tools shall be provided with user's manual that effectively communicates to a qualified mechanic how to use the controller and/or tool, and also defines and explains all respective error codes.

.4 Site specific service tools shall remain the property of the City.

.5 Elevator manufacturer shall provide technical training and support upon request to the City/agent (including other elevator maintenance companies) at a reasonable cost. Cost shall not exceed his then prevailing adjustor mechanic sell rates.

.6 Parts used in the manufacture, installation and maintenance of this elevator including replacement site specific service tools and manuals shall be available for purchase at fair market value by the City/agent including their elevator maintenance contractors.

2.6 Product Availability During Service Life of Elevators

.1 Elevator materials shall be available on the open market at reasonable market prices during the service life of the elevators. Proprietary materials that are either unavailable or prohibitively priced to other elevator service companies are prohibited.

2.7 Materials

.1 Steel:

.1 Sheet steel for exposed work: Stretcher-levelled, cold-rolled, commercial-quality carbon steel, complying with ASTM A1008/A1008M-13, matte finish.

.2 Sheet steel for unexposed work: Hot-rolled, commercial-quality carbon steel, pickled and oiled, complying with ASTM A1011/A1011M-14.

.3 Structural steel shapes and plates: ASTM A36 and AISI 1018.

.2 Stainless steel: Type 300 Series complying with ASTM A167-99(2009), with standard tempers and hardness required for fabrication, strength and durability.

.1 Supply with mechanical finish on fabricated work in the location shown or specified with texture and reflectivity required (Federal and NAAMM nomenclature). Protect with adhesive plastic film or paper covering.

.3 Aluminum: Extrusions per ASTM B221-21; sheet and plate per ASTM B209/B209M-21a.

.4 Fire-retardant treated particleboard panels: Minimum 0-1/2” (13 mm) thick backup for plastic laminate veneered panels, provided with suitable anti-warp backing; to meet CAN/ULC-S102-10 rating with flame-spread rating of 25 or less.

.5 Paint:

.1 Unexposed steel and/or iron: Clean metal of oil, grease, scale and other foreign matter and paint one shop coat of manufacturer's standard rust-resistant primer. Galvanized metal need not be painted.

.2 Clean exposed metal of oil, grease, scale and other foreign matter from exposed steel. Remove dents, scratches, or other defects that would affect the final finish. For material delivered with primer coat only, apply manufacturer's standard enamel primer. For material delivered with a finish coat apply 2 coats of manufacturer's standard enamel.

.3 Colour: to later selection by Contract Administrator from the manufacturer's standard colour selection.

.6 Non-shrink, non-metallic grout: Factory-packaged, non-staining, non-corrosive, nongaseous, non-metallic grout complying with ASTM C1107/C1107M-20.

2.8 Equipment

.1 Machine: electric gearless traction.

.2 Capacity: 1588 kg (3500 lbs).

.3 Rated car speed: 0.75 m/s (150 fpm).

.4 Elevator loading:

.1 Class A – General Freight Loading.

.5 Travel: as indicated on the drawings.

.6 Landings and openings: as indicated on the drawings.

.7 Operation Simplex Selective Collective.

.8 Hall entrances:

.1 Entrance size: 1067 mm (3’ 6”) wide.

.2 Entrance height: 2134 mm (7’ 0”).

.3 Openings: Locations: as indicated on drawings.

.4 Finish of hall doors and frames:

.1 Typical floors: Type 304 stainless steel with No. 4 finish.

.2 Ground floor: Type 304 stainless steel with No. 4 finish.

.9 Hoistway dimensions: as indicated on drawings.

.10 Stops: as indicated on drawings.

.11 Cab height: 2743 mm (9’).

.12 Pit depth:

.1 Notify Contract Administrator in writing during bid period whenever required dimensions vary from indicated dimensions.

.13 Clear overhead dimension:

.1 Notify Contract Administrator in writing during bid period whenever required dimensions vary from indicated dimensions.

.14 Signals:

.1 Car and hall push buttons:

.1 Type 304 stainless steel with No. 4 finish.

.2 One operating station per car.

.3 One set of hall push buttons at each landing entrance.

.4 In-car directional lanterns: mounted on door jamb.

.5 Hall lanterns: mounted above doors.

.6 Position indicator (hall): LED or dot matrix readout type position indicator on main floor.

.7 Position indicator (car): LED or dot matrix readout type position indicator.

.8 Audible signals (hall): audible cue to indicate arrival of elevator car, and to indicate which direction the car is travelling.

.9 Audible signals (car): audible signal shall sound in the car to tell the passenger that the car is either stopping or passing a floor served by the elevator.

.15 Power supply:

.1 3 phase, to be coordinated with Divisions 26, 27, and 28.

.16 Lighting power supply: 120 Volts, 1 Phase, 60 Hertz.

.17 Passenger cab:

.1 Front return:

.1 Type 304 stainless steel with No. 4 finish.

.2 Wall panels:

.1 Type 304 stainless steel with No. 4 finish.

.3 Handrails on non-access sides:

.1 Type 304 stainless steel with No. 4 finish.

.4 Base and reveal trim:

.1 Type 304 stainless steel with No. 4 finish.

.5 Cab doors:

.1 Type 304 stainless steel with No. 4 finish.

.6 Entrance doors:

.1 Type 304 stainless steel with No. 4 finish.

.7 Ceiling:

.1 Downlight type: metal pan with suspended LED downlights and dimmer switch. Downlights in accordance with platform size, minimum 6 lights.

.2 Metal pan finish:

.1 Type 304 stainless steel with No. 4 finish.

.8 Car top: steel with unitized construction, finished in white baked-on enamel with ceiling exit.

.9 One set of fire resistant protective pads complete with polished metal pad hooks.

.10 Double-speed exhaust fan in the car ceiling. Fan noise level shall not exceed 58 dBA above ambient, measured at center of cab.

.11 Flooring: TL1 flooring to match level 1 and level 2 adjacent floor finishes.

.18 Special features:

.1 Hands-free vandal resistant telephone incorporated into car operating panel.

.2 One set of tactile plates at each hall entrance, brushed finish stainless steel and embossed with black coloured raised floor level designations, fastened with flush finished stainless steel fasteners.

.3 Provide card access control, integrated with building system security.

.4 Rough in for card access control, integrated with building system security.

.5 This section shall provide a permanent certificate holder, consisting of a metal frame and Plexiglas cover, affixed in a visible location to the machine room wall.

.6 Special emergency devices:

.1 Firefighter's Emergency Operation Phase I and II – Emergency Recall and In-Car Emergency Operation.

.2 Automatic standby power operation with manual override: When the main line power is lost and stand-by power becomes available, elevators are recalled one at a time to a predetermined floor, open the doors, and shut down. Coordinate emergency power transfer switch and power change pending signals as required for termination at the primary elevator signal control cabinet in each group.

.3 Emergency car lighting: Battery powered emergency alarm and emergency lighting.

.7 Zoned Access: Equip elevators to permit operation of the car with the hoistway door opening at top and bottom landings, in order to permit access to the top of the car or to the pit.

.19 Provisions for future equipment:

.1 Rough-in for future CCTV system, COAX travelling cables. Provide accessible space, mounting supports, and wiring for CCTV in cab main front return panel. Provide COAX cable connected directly, with no intervening splices, from a terminal strip mounted adjacent to CCTV interface box in machine room.

.2 Rough-in for future security control of car. Provide accessible space, mounting supports, and wiring for security antenna and security controller in cab main front return panel. Provide 10 conductor 18 American Wire Gauge shielded cable connected directly, with no intervening splices, from terminal strip mounted adjacent to security interface box in machine room.

.20 Emergency battery power supply:

.1 When the main line power is lost for longer than 5 seconds the emergency battery power supply provides power automatically to the elevator controller. The elevator will rise or lower to the first available landing, open the doors, and shut down. The elevator will return to service upon the return of normal main line power.

2.9 Telephone/Auto Dialler and Car Service Cabinets

.1 Elevator telephone system shall be on its own phone line.

.2 Elevator telephone system shall meet the elevator code requirements for car emergency signalling devices, and shall be able to establish voice communications between a passenger and a person outside the hoistway in a location in the building that is readily accessible to authorized and emergency personnel.

.3 In the event that the building telephone is not answered, design elevator telephone system to automatically re-direct call within 30 seconds to an additional on- or off-site location, staffed by authorized personnel where an appropriate response can be taken.

.4 Elevator telephone system shall be provided with user-programmable auto-dial memory, powered by telephone line, pulse or tone, car cab ringer to accept incoming calls, automatic shut-off.

.5 Telephone shall initially be programmed to ring through to locations as determined by Contract Administrator.

2.10 Duplex Operation

.1 The elevators shall be automatic by means of the car buttons and one riser of hall buttons. Cars will operate either up or down to answer all their car calls in sequence as the floors are reached. Any car travelling in answer to a car call shall stop for hall calls which are registered in the direction of travel.

.2 Only one car will respond to a hall call. An up or down hall call occurring below and up-travelling car or an up or down hall call occurring above a down-travelling car shall cause a parked car to respond to the call. A car shall reverse after the uppermost or lowermost car landing call has been answered and proceed to answer car calls and landing calls registered for opposite direction of travel.

.3 If either car is removed from service, the other car shall immediately answer all landing calls as well as its own car calls.

2.11 Equipment – Control Components

.1 Controller: A microcomputer based control system shall be provided to perform all of the functions of safe elevator operation. The system shall also perform car and group operational control.

.1 High voltage (110V or above) contact points inside the controller cabinet shall be protected from accidental contact in a situation where the controller doors are open.

.2 Controller shall be separated into two distinct halves; Motor drive side and control side. High voltage motor power conductors shall be routed so as to be physically segregated from the rest of the controller.

.3 Field conductor terminations points shall be segregated; high voltage (>30 volts DC and 110 VAC) and low voltage (< 30 volts DC).

.4 Controllers shall be designed and tested for Electromagnetic Interference (EMI) immunity according to the EN 12016 (May 1998): “EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 – immunity”.

.5 Power disconnect: provided by elevator Subcontractor included with integrated assembly.

.6 Location: door jamb mounted.

.2 Drive: A Variable Voltage Variable Frequency AC drive system shall be provided.

2.12 Equipment – Hoistway Components

.1 Machine: AC gearless machine, with a synchronous permanent-magnet motor, dual solenoid service and emergency disc brakes.

.2 Machine location:

.1 Notify Contract Administrator in writing during bid period whenever required dimensions vary from indicated dimensions.

.3 Governor: The governor shall be a tension type governor.

.4 Hoistway operating devices:

.1 Emergency stop switch in pit.

.2 Terminal stopping switches.

.5 Positioning system: Consists of an encoder, reader box, and door zone vanes.

.6 Guide rails and attachments: Steel rails with brackets and fasteners.

.7 Coated steel belts: Polyurethane coated belts with high-tensile-grade, zinc-plated steel cords.

.8 Governor rope: Governor rope shall be steel and shall consist of at least eight strands wound about a sisal core centre.

.9 Fascia: Galvanized sheet steel shall be provided at the front of the hoistway.

2.13 Buffers

.1 Car and counterweight, where required by elevator code.

2.14 Motor

.1 The motor shall be designed and built expressly for elevator service with a high starting torque and low starting current. The motor armature shall be dynamically balanced and supported by ball bearings of ample capacity.

2.15 Brake

.1 The electric brake shall be spring applied. It shall be held open by an electro-magnet actuated by the controller and designed to make smooth, positive stops. It shall be designed to automatically apply in event of interruption of power supply for any cause.

2.16 Signals and Controls

.1 Operating panel and signalling devices shall be 'Barrier Free' accessible to applicable regulations.

.2 Car operating panel:

.1 A full swing operating panel pierced to contain the devices required shall be installed in the front return panel of each car and shall contain the devices required for the specified operation, and to meet Code requirements.

.2 Floor buttons in the car station shall illuminate when a call is registered, and remain illuminated until the particular car stop has been made.

.3 Call buttons: stainless steel, complete with black painted stainless steel Braille.

.3 Landing buttons: Provide impulse riser of landing pushbutton stations. Each intermediate station to consist of two illuminated stainless steel pushbuttons with raised direction arrows.

.1 Furnish stainless steel plates with the following finish:

.1 No. 4.

.2 Provide call buttons with black painted stainless steel Braille.

.4 Position indicator:

.1 In the elevator cab header, a surface mounted digital readout position indicator shall be provided.

.2 Provide audible floor position indicators. A 20 decibel, 1500 Hz maximum frequency tone to be emitted upon arrival at each floor level or pre-recorded voice announcing the floor number.

.5 Hall position indicator:

.1 A readout type position indicator shall be provided over the main floor front entrance. The position indicator shall indicate the position of the car in the hoistway.

.2 Cover plate shall be finished in satin lustre stainless steel and shall be securely mounted.

.3 Provide audible cue to indicate arrival of elevator car, and to indicate which direction the car is travelling.

.6 Directional lanterns: Provide directional lanterns in accordance with the elevator code, as follows:

.1 Provide units with illuminated arrows, but provide single arrow at terminal landings with illuminated elements projecting from faceplate for ease of angular viewing.

.2 Provide units with flat faceplate for mounting with body of unit recessed in wall or jamb.

.3 The faceplate shall be furnished in satin lustre stainless steel and shall be securely mounted.

.7 Provide colour/brightness contrasted raised Arabic and Braille numerals and universal symbols to meet elevator code requirements, to hoistway and hall control buttons.

.8 Provide vandal resistant buttons.

2.17 Doors and Entrances

.1 Door operation:

.1 A direct current motor driven operator shall be furnished and installed, designed to operate the car and hoistway doors simultaneously at a maximum opening speed of 610 mm/s (24 inches/sec) and a maximum closing speed of 300 mm/s (11.8"). Door movements shall be electrically cushioned at both limits of travel and the door operating mechanism shall be arranged for manual operation in the event of power failure.

.2 The leading edge of the car door shall be provided with electronic protective device, arranged to automatically return the car and hoistway doors to the open position in the event the doors edge system detects an obstruction, for the full height of door, during the closing cycle, in accordance with the elevator code. The doors shall automatically open as the car arrives at the landing and shall automatically close after an adjustable time interval or when the car is dispatched to another landing.

.3 Door operation shall include nudging feature as per the elevator code. If the door detector is operated continuously for more than 20 seconds, close the doors slowly under reduced speed and force, and actuate an audible warning signal.

.4 Direct drive geared operators, AC controlled units with oil checks, or other deviations from the above are not acceptable.

.2 Door hangers and tracks:

.1 For each hoistway sliding door, furnish sheave type two point suspension hangers and tracks complete.

.2 Nylon sheave shall not be less than 75 mm (3") in diameter with ball bearings properly sealed to retain grease. Hangers shall be provided with an adjustable roller to take the up-thrust of the doors. Tracks are to be formed steel shapes with smooth surfaces and shaped to conform to the hanger sheaves.

.3 Door type:

.1 Doors shall be formed from not less than 1.5 mm (0.06") 16 gauge sheet metal for front panels, and for hoistway side satin coat steel panels shall be flush and separated by suitable steel reinforcing. Door edges shall be filled and finished smooth. Provide bottom of doors with proper guides of composite material to operate in sill slots with minimum clearance. Guides shall allow for lateral adjustment of hall doors in both directions (away from or in towards the rear hoistway wall). Top of doors shall be reinforced and be capable of carrying weight of door and hanger pendant bolts.

.2 Hoistway door operation shall be smooth. Design door equipment to operate with minimum noise.

.4 Interlocks:

.1 Each hoistway entrance shall be equipped with an approved type interlock tested as required by Code.

.2 The interlock shall be designed to prevent operation of the car away from the landing until the doors are locked in the closed position as defined by elevator code, and shall prevent opening the doors at any landing from the corridor side unless the car is at rest at that landing or is in the levelling zone and stopping at that landing.

.5 Hoistway door unlocking device:

.1 Hoistway door unlocking devices, required by the elevator code shall be provided to permit authorized persons to gain access to the hoistway when the elevator car is away from the landing.

.6 Entrance frames: 90 minute fire resistance rated, with label.

.7 Sills:

.1 Extruded aluminum, non-slip wearing surface.

.2 Recess the extruded threshold plate to accommodate floor finishes.

2.18 Sling

.1 The sling shall consist of heavy steel channel stiles, properly affixed to a steel crosshead and safety channels with adequate bracing members to remove all strain from the car enclosure.

2.19 Structural Shapes for Support of Various Elevator Components

.1 Provide structural-steel shapes for entrance frames.

.2 Refer to Section 05 50 00 for the following items:

.1 Divider beams.

.2 Hoist beams.

.3 Pit ladders.

PART 3- EXECUTION

3.1 Preparation

.1 Take field dimensions and examine conditions of substrates, supports, and other conditions under which this work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

3.2 Guide Rails and Brackets

.1 Erect guide rails plumb and parallel within maximum deviation of 6 mm (1/4”).

.2 Use metal shims only to a maximum of 25 mm (1") and provide lock washers under nuts and tapped bolts.

.3 Compensate for expansion and contraction of guide rails.

.4 Use splice plates and guide rails with contact surfaces accurately machined to form smooth joints. Clean running faces guide rails before final acceptance.

.5 Properly locate guide rails and related supports at locations in accordance with manufacturer’s recommendations and approved shop drawings. Anchor to building structure using isolation system to minimize transmission of vibration to structure.

3.3 Installation

.1 Comply with manufacturer's written instructions.

.2 Set entrances true with plumb hoistway lines.

.3 Erect elevator closures in accordance with labelling requirements.

.4 Exposed work in cars and at entrances shall be fabricated in true planes, flat and straight, free of buckles, waves and other visible imperfections such as "oil canning". Joints shall be accurately fitted and properly aligned. Conceal fasteners. Welds shall be undetectable in finished work.

.5 Lubricate operating parts of systems, including ropes (if required), as recommended by manufacturers.

.6 Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to minimize transmission of vibrations to structure and thereby minimize structure-borne noise from elevator system.

.7 Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts.

.8 Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

.9 Set sills flush with finished floor surface at landing. Fill space under sill solidly with non-shrink, non-metallic grout.

.10 Remove dust and debris from machine rooms, elevator cars (interior and exterior), and elevator pits.

.11 Perform fine tuning and adjusting to comply with the elevator code and this specification section.

3.4 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.2 Inspection and testing: In accordance with requirements of local jurisdiction, obtain required permits, inspections and tests.

3.5 Adjusting and Cleaning

.1 Upon completion, touch-up and restore to new condition any damaged or defaced factory finished surfaces.

.2 Remove protective covering and clean exposed surfaces after completion and leave in undamaged condition.

.3 Include in price for re-buffing stainless steel doors, after move-in, and finishes are installed.

3.6 Closeout Activities

.1 Demonstration:

.1 Instruct City's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train City's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.

.2 Make a final check of each elevator operation, with City's personnel present, immediately before date of Substantial Performance. Determine that control systems and operating devices are functioning properly.

.3 Check operation of each elevator with City's personnel present not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

.2 Testing:

.1 Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required by governing regulations and agencies.

.2 Supply instruments and carry out performance checks of equipment, including control and operation system. Performance check shall be done in presence of Contract Administrator and City. Notify Contract Administrator and City in writing, at least 1 week prior to date of performance and operational inspection. This section shall be responsible for additional tests required because of outstanding deficiencies.

END OF SECTION

PART 1 – GENERAL

1.1 Section Includes

.1 This Section specifies requirements for the supply and installation of separation geotextile for:

.1 Road construction

.2 Parking lot construction

.3 Sidewalk and pathway construction

1.2 Submittals

.1 Submit shop drawings and product data for review by the Contract Administrator. Submittals to include but not limited to:

.1 Non-Woven Geotextile.

.2 Geogrid

PART 2- PRODUCTS

2.1 Geotextile

.1 Non-woven geotextiles shall conform to the latest edition of City of Winnipeg Standard Construction Specification CW 3130 Supply and Installation of Geotextile Fabrics.

.1 Use separation/filtration geotextile as defined in CW 3130.

.2 Geogrid shall conform to the latest edition of City of Winnipeg Standard Construction Specification CW 3135 Supply and Installation of Geogrid.

.1 Use Class A geogrid as defined in CW 3135.

PART 3- EXECUTION

3.1 Installation

.1 Install non-woven geotextile in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 3130 Supply and Installation of Geotextile Fabrics.

.2 Install geogrid in accordance with the latest edition of the City of Winnipeg Standard Construction Specification CW 3135 Supply and Installation of Geogrid.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 Section 31 22 13 - Rough Grading.

1.2 Regulatory Requirements

.1 Conform to CW3010 and all applicable code for environmental requirements.
.2 Coordinate Clearing Work with utility companies.

1.3 Definitions

.1 Isolated Trees Clearing consists of cutting off designated trees flush to ground and disposing of felled trees and debris.

.2 Isolated Underbrush Clearing consists of selective removal of undergrowth, deadwood, and trees smaller than 15mm trunk diameter from treed areas and disposing of all fallen timber and surface debris.

.3 Grubbing consists of excavation and disposal of stumps and roots, boulders and rocks below existing ground surface.

1.4 Protection

.1 Prevent damage to trees, landscaping outside limit of work as indicated on Drawings, benchmarks, existing buildings, existing pavement, existing furnishings, utility lines, site appurtenances, water courses, and root systems of trees which are to remain.
  .1 Repair any damaged items to approval of the Contract Administrator.
  .2 Replace any trees designated to remain, if damaged, to the satisfaction of the Contract Administrator.

PART 2 – PRODUCTS – NOT APPLICABLE

PART 3 – EXECUTION

3.1 Protection

.1 Erosion and Sediment Control Measures
  .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to the sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005.
  .2 Inspect, repair, and maintain temporary erosion and sedimentation control measures during construction until permanent vegetation has been established.
  .3 Remove temporary erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 Preparation

.1 Inspect site and verify with the Contract Administrator, items designated to remain. Contract Administrator to take photos of all items designated to remain, if any, prior to the start of construction.
.2 Verify that existing vegetation designated to remain is tagged or identified.
.3 Protect trees, plant growth, and features designated to remain, as final landscaping.
.4 Identify the method of disposal as well as the intended location for the disposal of removed materials.
.5 Protect benchmarks and existing structures from damage or displacement.
.6 Notify utility authorities before commencing any work.
.7 Locate and protect utility lines. Preserve in operating condition active utilities traversing site.
.8 Trees are to be felled to land within the limits of the works. The Contractor shall take all precautions to prevent damage to traffic, structures, pole lines, adjacent property and to trees and shrubs designated to be saved, and he shall be liable for any damages occurring in the performance of this work.

3.3 Clearing

.1 Clearing includes felling, trimming, and cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, brush, and rubbish occurring within cleared areas.

.2 Clear as indicated by City of Winnipeg and Contract Administrator, by cutting at height of not more than 305 mm above ground. In areas to be subsequently grubbed, height of stumps left from clearing operations to be not more than 1000 mm above ground surface.

3.4 Grubbing

.1 The Contractor shall cut down all trees and shrubs, except those designated by the Contract Administrator to be saved and grub out all stumps and roots.
.2 Remove and dispose of roots larger than 7.5 cm in diameter, matted roots, and designated stumps from indicated grubbing areas.
.3 Grub out stumps and roots to not less than 250mm below ground surface.
.4 Grub out visible rock fragments and boulders, greater than 300mm in greatest dimension, but less than 0.25m3.
.5 Fill depressions made by grubbing with suitable material and to make new surface conform with existing adjacent surface of ground.

3.5 Removal and Disposal

.1 The Contractor shall load and haul all trees, stumps, roots, logs, brush, rubbish and all other surface litter from the site and dispose of these materials at dumps located by the Contractor and approved by the Contract Administrator.
.2 Mechanically and/or chemically treat stumps and roots as indicated on drawings.

.3 Remove cleared and grubbed materials and legally dispose of all material off site.
.4 Remove diseased trees identified by the City of Winnipeg and legally dispose of them off site.
.5 Any materials dropped or spilled on any streets during the hauling operations shall be promptly cleaned up by and at the expense of the Contractor, to the satisfaction of the Contract Administrator.

3.6 Topsoil Excavation

.1 Do not excavate wet topsoil.
.2 Stockpile in area designated on site to depth not exceeding 2.5 m and protect from erosion.
.3 Remove excess topsoil not intended for reuse, from site.

3.7 Finished Surface

.1 Leave ground surface in condition suitable for immediate grading operations.

END OF SECTION

PART 1 – GENERAL

1.1 Section Includes

.1 This section specifies the manner to restore lands affected by trenching operations and areas to be included in finish grading.

1.2 References

.1 ASTM D698-12 (2021); Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

.2 City of Winnipeg Standard Construction Specifications.

1.3 Protection

.1 Prevent damage to trees, landscaping, natural features, bench marks, existing buildings, fences, existing roadways and surface or underground utility lines which are to remain. Make good any damage.

.2 Protect newly graded and filled areas from washouts and settlement caused by rain and runoff. Correct any damage as necessary.

.3 Maintain access roads to prevent accumulation of construction debris on roads within and adjacent to the construction site.

.4 Place geotextile over catch basins and manholes to prevent sedimentation during rough and fine grading operations. Maintain geotextile throughout the duration of construction.

PART 2- PRODUCTS

2.1 Materials

.1 Fill Material:

.1 Common Fill: to the latest edition of City of Winnipeg Specification CW 3170 – Earthwork and Grading, subject to approval by the Contract Administrator.

.2 Fill under landscaped areas should conform to the latest edition of City of Winnipeg Specification CW3110 for Granular Base Course (Base) or Granular A 50 mm (Sub-Base), and should be submitted to the Contract Administrator for approval prior to importing to site.

.3 Fill to be:

.1 550 mm below finished grade for shrub beds (450 mm Planting Soil, 100 mm mulch)

.2 100 mm below finished grade for sod

.3 Fill below asphalt, cast-in-place concrete and crushed granular paving: Class 2 backfill conforming to the latest edition of City of Winnipeg Specification CW2030.

.4 Fill material to be unfrozen and free from rocks larger than 75 mm, cinders, ashes, sod, refuse and other deleterious materials.

PART 3- EXECUTION

3.1 Stripping of Topsoil

.1 While the Owner has previously stripped topsoil from the site, any remaining topsoil to be stripped as part of rough grading works.

.2 Do not handle topsoil while in a wet or frozen condition, or in any manner in which soil structure is adversely affected.

.3 Commence topsoil stripping of required areas after site has been cleared and temporary silt protection has been properly installed.

.4 Strip topsoil to full depth.

.5 Do not mix topsoil with subsoil.

.6 Stockpile in locations approved by the Contract Administrator.

.7 Dispose of unused topsoil off site.

3.2 Rough Grading

.1 Verify rough grades and notify the Contract Administrator of discrepancies prior to performing work.

.2 Rough grade to levels, profiles and contours indicated, allowing for surface treatment as indicated on the drawings.

.3 Compact sub-grade to density requirements noted in the drawings and the geotechnical report.

.4 Inspect sub-grade exposed by topsoil stripping with the Contract Administrator and identify any problem areas that will require remediation. Cut out areas of unsuitable sub-grade not capable of compaction and fill with Class 2 backfill in accordance with the latest edition of CW2030.

.5 Ensure positive drainage at all times throughout the site and notify the Contract Administrator immediately of potential ponding areas.

.6 Rough grade to specific depths below finish grades to accommodate sub-surface drainage lines as indicated on the drawings.

.7 Place fill in maximum 150 mm lifts.

.8 Slope rough grade away from structures.

.9 Grade slopes for landscape areas to a maximum of 3:1 unless otherwise specified on drawings.

.10 Grade ditches and swales to depths indicated on the drawings. Ensure gradient transitions are smooth and drain in the direction indicated on the drawings.

.11 Prior to placing fill over existing ground, scarify surface to a minimum depth of 150 mm. Maintain fill and existing surface at the same moisture content to facilitate bonding of the materials.

.12 Compact filled and disturbed areas as indicated in the geotechnical report.

.13 Do not disturb soil within tree protection zone of trees and shrubs indicated to remain.

.14 Finished rough-grade surface to be free of debris or stones larger than 50 mm.

.15 Remove surplus materials and material unsuitable for fill, grading or landscaping off site at no expense to the Owner.

3.3 Verification of Rough Grade

.1 Obtain approval of rough grading from the Contract Administrator prior to commencing finish grading. Correct discrepancies to the satisfaction of the Contract Administrator.

3.4 Testing

.1 Carry out material and compaction testing in accordance with Section 01 45 00 – Quality Control and Testing.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Excavation and backfilling for work in areas within building footprint.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

.1 Independent inspection and testing company shall attend the pre-installation meeting.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material test reports: For each material proposed for backfill as follows:

.1 Classification according to ASTM D2487-17.

.2 Laboratory compaction curve according to:

.1 Standard Proctor Maximum Dry Density (SPMDD): in accordance with ASTM D698-12(2021).

.3 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor’s LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor’s LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 General: granular material in accordance with City of Winnipeg Specification CW3110-R2-Dated November 15, 2022.

.1 Base Course: Gradation A.

.2 Sub-base: Gradation A or B, 50-100 mm.

.2 Native high plastic clay (CH) used for backfilling: Clean high plastic clay (CH) excavated at site and approved by geotechnical engineer may be used where permitted. Native fill for backfilling shall not include lean clay (CL), topsoil/peat, silt, soil containing organic material, and over saturated material.

.3 Backfilling free draining material shall consists of granular material with less than 5% fines (passing the #200 sieve), and as approved by geotechnical engineer.

.4 Moisture content of fill shall be within 2% of optimum moisture density test (ASTM D698-12(2021)).

.5 Obtain fill materials from sources approved by geotechnical engineer. Submit reports for acceptance prior to importing fill.

PART 3 - EXECUTION

3.1 Dewatering

.1 Contractor shall prevent surface run-off from accumulating within excavations by directing water away from open excavations by use of proper site grading. Water which does accumulate within excavations should be collected with appropriate trenching and removed from the excavation using suitable pumps. All soft or saturated materials should be removed from excavations prior to backfilling.

3.2 Excavating

.1 Excavate to elevations and dimensions required for installation, construction and inspection of the Work. Remove and dispose of waste, soil and like materials from the Site and pay dumping costs.

.2 Removal of existing boulders and/or concrete elements up to a size of 1 m^3 (1.3 yd^3), encountered below existing grade while excavating, are included as part of the Work.

.3 Notify Contract Administrator at each time of occurrence when existing boulders and/or concrete elements greater than 1 m^3 are encountered below existing grade, providing detailed record of each occurrence in writing and digital photographic documentation. This record must be approved by the Contract Administrator before claims for extras will be considered.

.4 If upon excavating to the specified elevations, it is found that existing conditions are not fulfilled, adjust the excavations accordingly, but only with the written authorization of the Contract Administrator.

.5 Remove water, disturbed soil or foreign matter from footing excavations before placement of reinforcement or concrete.

.6 During cold weather, prevent soil which will be adjacent to or beneath concrete from freezing.

.7 Excavation will not be considered complete until the soil at founding elevation is inspected and approved by the geotechnical engineer.

3.3 Backfilling

.1 Commence backfilling after areas of Work to be backfilled have been inspected, and pipe and conduit joints tested and accepted by Contract Administrator.

.2 Areas to be backfilled shall be free from debris, snow, ice, water or frozen ground. Backfill material shall not be frozen or contain ice, snow or debris.

.3 Prior to placing fill under concrete slabs, proofroll the subgrade as directed by the geotechnical engineer. Remove soft, wet, or other deleterious material and replace with approved fill compacted to 98% of its Standard Proctor Maximum Dry Density, or import granular fill to stabilize the subgrade, and form a working mat, under the supervision of geotechnical engineer.

.4 Backfill simultaneously each side of walls and other structures to equalize soil pressures.

.5 Obtain Contract Administrator’s acceptance prior to placing backfill against foundation walls enclosing interior space.

.6 Request reviews by Contract Administrator and geotechnical engineer of excavation prior to beginning backfilling.

.7 Where temporary unbalanced earth pressures are liable to develop on walls or other structures, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Contract Administrator.

.8 Place and compact fill materials in continuous horizontal layers not exceeding 150 mm (6") loose depth.

.9 Use backfilling methods to prevent disturbing or damaging buried services and site improvements.

3.4 Fill Types and Compaction

.1 Dimensions specified in following paragraphs are minimum dimensions of fill after compaction.

.2 Compaction shall be to applicable Standard Proctor Maximum Dry Density (SPMDD).

.3 Concrete floor slab base course:

.1 Provide minimum 150 mm (6") granular base course over 300 mm (12") sub-base to underside of slab compacted to at least 98% of its SPMDD and within 2% of optimum moisture content.

.4 Re-grading and backfill against foundation walls:

.1 Native High Capacity Clay (CH) compacted at least 95% SPMDD. Place in maximum loose 150 mm lifts.

.5 Underground services: Refer to Sections 20 05 73.00, 31 23 10 and 33 05 23.00.

.6 Landscape: Refer to Section 31 23 17.

3.5 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.2 In-situ tests and inspections:

.1 Allow independent inspection and testing company to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

.2 Inspections:

.1 Determine prior to placement of fill that site has been prepared in compliance with requirements.

.2 Determine that fill material and maximum lift thickness comply with requirements.

.3 Determine, at the required frequency, that in-place density of compacted fill complies with requirements.

.3 Testing:

.1 Testing company will test compaction of soils in place according to requirements of Contract Documents. Tests will be performed at the following locations and frequencies:

.1 Building slab areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 200 sq. m (2152 sq. ft.) or less, but in no case fewer than three tests.

.2 Foundation wall backfill: At each compacted backfill layer, at least one test for every 30 m (100 feet) or less of wall length, but no fewer than two tests.

.3 Trench backfill: At each compacted initial and final backfill layer, at least one test for every 50 m (164 feet) or less of trench length, but no fewer than two tests.

END OF SECTION

PART 1 – GENERAL

1.1 Section Includes

.1 This section specifies requirements of excavating and backfilling for trenching and pipe installations.

1.2 References

.1 ASTM C136/136M-19; Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTM D698-12(2021); Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft^3 (600 kN-m/m^3)).

.3 CAN/CGSB 8.2-M88; Sieves, Testing, Woven Wire, Metric.

1.3 Definitions

.1 Common excavation: Excavation of materials of whatever nature, which are not included under definitions of rock excavation including dense tills, hardpan, frozen materials and partially cemented materials which can be ripped and excavated with heavy construction equipment.

1.4 Cold Weather

.1 Be responsible for all cold weather requirements.

.2 No payment will be made for frost removal.

1.5 Protection

.1 Existing buried utilities and structures including water, sewer, gas, electric and telecommunications:

.1 Before commencing work, confirm location of existing buried utilities within and adjacent to site and follow applicable utility guidelines for works near utilities.

.2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.

.3 Remove obsolete buried services within 2 m of foundations; cap cut-offs.

.4 Size, depth and location of existing utilities and structures, where indicated, are for guidance only. Completeness and accuracy is not guaranteed.

.5 Prior to commencing any excavation work, notify Contract Administrator and applicable authorities having jurisdiction and establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during the work.

.6 Conduct, with Contract Administrator, a survey of existing fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments affected by the work.

.7 Maintain and protect from damage utilities and structures encountered. Obtain direction of Contract Administrator and utility representative before moving or otherwise disturbing utilities or structures. In event of damage, immediately make repair to approval of utility representative and the Contract Administrator.

.8 Repair any damage to utilities in accordance to the direction of the utility owner at no cost to the Owner and/or the Contract Administrator.

.2 Existing buildings and surface features:

.1 Conduct, with Contract Administrator, a condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, paved surfaces, survey bench marks and monuments which may be affected by the work.

.2 Protect existing buildings and surface features which may be affected by the work from damage while work is in progress and repair any damage resulting from work at no additional cost to the Owner.

.3 Where excavation necessitates root or branch cutting, do so only as approved by Contract Administrator. If pruning is necessary, make cuts clean, smooth and slanted. Apply tree paint to all wounds.

.3 Prefabricated cages and shields:

.1 Whenever prefabricated cages or shields are used, they shall comply with all applicable safety regulations, provide safe access and egress to the cage and permit placing and tamping of bedding material under and around piping.

.2 Provide safe access and egress to the cage or the trench for the use of the Contract Administrator to view pipe installations at all times. This includes ramps to access the cage or trench.

.4 Shoring and bracing:

.1 Whenever shoring, sheeting, timbering and bracing of excavations is required it shall comply with all applicable safety regulations, provide safe access and egress to the area and permit placing and tamping of bedding material under and around piping.

.5 Utilities:

.1 Check with utility companies to locate and advise utility of proposed construction activities regarding buried pipe, cables, services and hydro pole requirements.

.2 For new construction around a hydro pole, Manitoba Hydro generally requires 1.0 metre of undisturbed flat ground around the hydro pole then a maximum slope of 2:1 to ground elevation. Register all construction activities around hydro poles with Manitoba Hydro and complete works as directed by Manitoba Hydro.

.1 Trench sidewalls shall be minimum 3 m from hydro poles unless otherwise approved by Manitoba Hydro.

.6 Maintain unobstructed access to fire and police appurtenances, telephone, electric, water, sewer and other public utilities and private properties.

.7 Protect open excavation against flooding and damage from surface run-off water.

PART 2- PRODUCTS

2.1 Bedding and Backfill Materials

.1 Bedding and backfill materials shall be in accordance with the latest edition of the City of Winnipeg Standard Construction Specification CW 2030 Excavation, Bedding and Backfill.

.2 Use sand for pipe bedding unless otherwise stated in Section 33 11 00.

.3 Use Class 2 or Class 3 Backfill for all trenches and excavations located within or adjacent (within 1 metre) to existing or proposed paved areas.

.4 Use Class 4 Backfill for all trenches and excavations located within the boulevards, grassed areas, softscape and turf areas.

PART 3- EXECUTION

3.1 Construction Methods

.1 Conduct all works in accordance with the latest edition of the City of Winnipeg Standard Construction Specification CW 2030 Excavation, Bedding and Backfill.

3.2 Restoration

.1 Upon completion of work, remove waste materials and debris, trim slopes and correct defects as indicated by the Contract Administrator.

.2 Replace topsoil in areas indicated.

.3 Clean and reinstate areas affected by work to condition which existed before excavation.

.4 Reinstate areas affected by work to elevation indicated on the drawings.

.5 Restore all pavements, sidewalks, lawns and plantings which existed prior to the work, to the satisfaction of the Contract Administrator.

END OF SECTION

PART 1 – GENERAL

1.1 Section Includes

.1 This section specifies the materials and execution procedures for grading and construction of access roads, sidewalks, pathways and parking lots.

1.2 References

.1 ASTM C136/C136M-19; Standard test Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTM D698-12(2021); Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/tf^3 (600 kN-m/m^3)).

.3 ASTM D4318-17e1; Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.4 CAN/CGSB 8.2-M88; Sieves, Testing, Woven Wire, Metric

.5 Geotechnical Report.

1.3 Utility Services

.1 Check with utility companies to locate and advise utility of proposed construction activities regarding buried pipe, cables, services and hydro pole requirements.

PART 2- PRODUCTS

2.1 General

.1 Subgrade materials shall be in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 3110 Sub-Grade, Sub-Base and Base Course Construction and the Geotechnical Report.

PART 3- EXECUTION

3.1 Construction Methods

.1 Complete all works in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 3110 Sub-Grade, Sub-Base and Base Course Construction.

END OF SECTION

PART 1 – GENERAL

1.1 Work Included

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, plant and equipment to complete the pile foundation work indicated on the drawings and specified herein.

1.2 Related Work Specified Elsewhere

.1 Concrete Reinforcement, Section 03 20 00.

.2 Cast-in-Place Concrete, Section 03 30 00.

.3 Structural Steel, Section 05 12 00.

1.3 Reference Standards, Codes And Acts

.1 Conform to the requirements of the local building code identified on the Structural General Notes as amended by all subsequent Regulations issued to the date of this Specification and applicable acts of authorities having jurisdiction.

.2 All references to the Standards and publications noted below shall be to the edition referenced in the local building code identified on the Structural General Notes, or to the edition referenced in the latest published editions or revisions of all Standards published by the Canadian Standards Association issued to the date of this Specification, whichever is the later edition or revision.

.3 All references noted below, which are not referenced by the local building code or the Standards published by the Canadian Standards Association, shall be to the latest edition and revision published to the date of this Specification.

.4 Standards and publications referenced by the Standards noted below are to apply even if they are not included in the list. Where such reference is made, it shall be to that latest edition and revision published to the date of this Specification.

.1	CAN/CSA-A23.1	Concrete Material and Methods of Concrete Construction
.2	CAN/CSA-G30.18	Billet-Steel Bars for Concrete Reinforcement
.3	CAN/CSA-G40.20	General Requirements for Rolled or Welded Structural Quality Steel
.4	CAN/CSA-G40.21	Standard Quality Steel
.5	O80 Series	Wood Preservation
.6	CAN/CSA O141	Softwood Lumber

.5 Where there are differences between the specifications and drawings and the codes, standards or acts, the most stringent shall govern.

1.4 Tolerances

.1 Install piles within the following tolerances:

.1 Out of plumb: 2% of pile length.

.2 Location at cut-off: +80 mm (3").

.3 Cut-off elevation: +80 mm (3").

.4 Pile shafts shall not be less than the diameter specified.

.2 Interfacing tolerances may not be compatible with the above. Review and coordinate interfacing tolerances so that the various elements come together properly.

1.5 Geotechnical Investigation

.1 A geotechnical investigation of the site has been conducted by KGS Group. Their report dated 2024-03-19 is available from the Contract Administrator.

.2 This information is given solely as a guide. No responsibility is accepted by the City or Contract Administrator for its correctness, nor shall its accuracy affect the provisions of the contract.

.3 Read this report, visit the site and thoroughly familiarize yourself with surface and subsurface conditions.

1.6 Design of Piles

.1 General

.1 The design has been based upon the use of 300Ø, 350Ø & 400Ø piles of 445kN, 625kN, 800kN SLS and 560kN, 784kN, 960kN ULS capacity each.

1.7 Submittals

.1 Erection and Fabrication Drawings

.1 Submit erection and fabrication drawings for review by the Contract Administrator.

.2 The structural drawings shall not be reproduced, in whole or in part, for use as erection and fabrication drawings.

.3 Amongst other items, show the following:

.1 Fully dimensioned layout of piles;

.2 Cut-off elevations;

.3 Assumed founding elevations;

.4 Design load of each pile and driving criteria;

.5 Pile materials, sizes and weights per metre and

.6 Splice and tip reinforcing details.

.4 In advance of construction, provide for the Contract Administrator's review the following:

.1 Complete pile driving information, including type of pile driving hammer, weight of striking part of ram and energy developed;

.2 Shop drawings showing piling layout, pile sizes and load capacity, reinforcement in piles, projecting dowels, cut-off elevations; and

.3 Concrete mix designs for each class of concrete certified by an independent inspection company as meeting the requirements of the specifications and drawings.

.2 As-Built Drawings

.1 Mark on a complete set of final drawings any changes, additions, or deletions that occur during construction as a result of the Contractor's work, change orders or for any other reason.

.3 Certificates

.1 Provide certification from an approved Independent Inspection and Testing Company that materials used for the piling work meet, as a minimum, the values stated in the pile design calculations reviewed by the Contract Administrator. The cost of certification of materials shall be borne by the Contractor.

1.8 Alternative Proposals

.1 If the Contractor wishes to provide an alternative pile type or vary pile diameter or spacing, he shall provide the Contract Administrator for approval, with complete proposals, including calculations.

.2 Any variation to pile caps or grade beams required thereby shall be designed and provided by the Contractor at Contractor's expense and the design shall be submitted to the Contract Administrator for approval along with the information noted above.

.3 Alternative pile types will not necessarily be approved by the Contract Administrator.

.4 The Contractor shall state in tender the type of pile upon which their tender is based.

PART 2 – PRODUCTS

2.1 Materials

.1 Concrete: Conform to CSA A23.1, the 28 day compressive strength is indicated on the drawings. The concrete for the pile base shall be zero slump concrete containing not less than 310 kg (525 lbs) of cement per cubic metre (yard) of concrete.

.2 Reinforcing Steel: Deformed steel conforming to CSA Standards of G30 series and to the material specification shown on the drawings.

PART 3 – EXECUTION

3.1 Layout

.1 Lines and levels shall be supplied by the Contractor. Check the lines and levels supplied and after checking, this Sub-contractor shall be responsible for their correctness and for their correct observance. Responsibility for the correctness of reference lines and bench marks shall rest with the Contractor.

.2 Commencement of driving of each pile shall be construed as acceptance of the line and level supplied.

.3 From the reference line and bench mark established for this contract, locate each pile and establish its elevation in order to complete the piling to the lines and levels shown on the drawings and to the specified tolerances.

3.2 Load Tests

.1 General

.1 Perform load tests on 2 piles. The first load test shall be performed in order to prove the theoretical pile design capacity by testing one of the first six piles driven. The piles to be tested will be chosen by the Contract Administrator.

.2 It the test pile does not meet the stipulated design capacity, drive piles to a suitably higher set (or deeper penetration) or use a lower pile design capacity and thereby increase the number of piles or employ such other alternatives such that the design loads will be safely supported by the pile system. Any additional costs to grade beams and/or pile caps and redesign of same, shall be the responsibility of the Contractor. After the design capacity of piles has been proven and as pile driving proceeds, the Contract Administrator will select the second pile to be tested.

.3 It a pile load test is not successful, carry out one or more additional load tests until the test is successful. Additional load tests required due to test failure shall be at the Contractor's expense.

.2 Acceptance Criteria

.1 Should results of any test pile show net settlement in excess of 0.25 mm per tonne of test load, a further test shall be carried out by reloading the pile gradually to a test load which will produce a maximum net settlement not in excess 0.25 mm per tonne of test load.

.2 The allowable working load of the type of pile involved shall then be established at 1/2 the last test load and additional piles shall be driven at the Contractor's cost as directed by the Contract Administrator wherever required to make up for the reduced allowable working load.

3.3 Driving

.1 General

.1 Drive piles to safely develop the design loads shown.

.2 Drive all piles to at least the same terminal set as that determined as being sufficient to develop the design load on the test pile.

.3 Driving shall be done with fixed leads which will hold the pile firmly in position and alignment and in axial alignment with the hammer.

.4 Driving of each pile shall be continuous without intermission until the pile has been driven to final resistance. The tops of piles shall be cut off true and level at the elevations indicated on the drawings. All portions battered or buckled or damaged or imperfect in any way shall be removed.

.5 Drive individual piles in pile clusters in such a way as to minimize the generation of increased driving resistance by compaction and displacement of the soil.

.6 At the termination of driving of each pile, take readings of the elevation of the top of the pile. On the completion of all piling in a cluster or nearby clusters, take elevation readings again to determine whether any heaving has occurred. If heaving has occurred, redrive the pile to the proper resistance or proceed as the Contract Administrator directs.

.7 Excessive heaving of piles may be a cause for rejection.

.8 The Contractor shall be responsible for additional cost of pile caps or grade beams arising out of misplaced piles which the Contract Administrator may accept as load carrying.

.9 Note the location of piles close to adjacent existing construction. Use pile driving equipment which can drive the piles in these locations without damaging the existing construction.

.10 The inside of each shell shall be inspected by the [Contract Administrator] before concreting. If any shell is found damaged or distorted to an extent likely to impair the capacity of the pile, such pile shall be rejected as "defective" and a substitute pile driven as directed by the [Contract Administrator].

.11 In a case where an obstruction is encountered above the bearing stratum, an attempt shall be made to drive through such obstruction.

.12 Quote a price for each complete additional pile. This price shall form the basis for extras should it be found necessary to add piles because of obstructions encountered.

3.4 Field Records

.1 Keep a record covering each pile installed. The record shall be jointly certified by the Contractor and the inspection company.

.2 Records shall indicate the following:

.1 Pile number and identification as to location;

.2 Tip elevation, cut-off elevation and length of pile, as installed;

.3 Terminal set;

.4 Elevation readings of butt end at completion of installation and subsequent to installing adjacent piles. A record of redriving, if necessary;

.5 Record of pile plumbness, position relative to designated position and verification that these are within tolerable limits; and

.6 Remarks concerning unusual driving conditions, obstructions, damage to piles caused by driving or other similar data.

.3 No piles in a cluster shall be concreted until all the piles in a cluster are driven.

3.5 Quality Control

.1 Provide a system of quality control to ensure that the minimum standards specified herein are attained.

.2 Bring to the attention of the Contract Administrator any defects in the work or departures from the Contract Documents which may occur during construction. The Contract Administrator will decide upon corrective action and state recommendations in writing.

.3 The Contract Administrator's general review during construction and inspection and testing by Independent Inspection and Testing Companies reporting to the Contract Administrator are both undertaken to inform the Client of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve him of contractual responsibility.

3.6 Notification

.1 Prior to commencing significant segments of the work, give the Contract Administrator and independent inspection and testing agencies appropriate notification so as to afford them reasonable opportunity to review the work. Failure to meet this requirements may be cause for the Contract Administrator to classify the work as defective.

3.7 Inspection And Testing

.1 The City will appoint the Independent Inspection and Testing Company to make inspections or perform tests as the Contract Administrator directs. The Independent Inspection and Testing Company shall be responsible only to the Contract Administrator, and shall make only such inspection or tests as the Contract Administrator may direct.

.2 When defects are revealed, the City may request, at the Contractor's expense, additional inspection or testing to ascertain the full extent of the defect.

.3 Inspection firm shall amongst other items, inspect the following:

.1 Concrete cylinder strength tests to the requirements of A23.2, except that cylinders of zero slump concrete shall be prepared in a manner approved by the Contract Administrator.

.2 Fabrication, size, location, plumbness and cut-off elevation of piles.

.3 Driving of piles.

.4 Filling of annular space.

.4 Assist the inspection firm in making inspections or tests as required.

3.8 Defective Materials And Work

.1 Where evidence exists that defective work has occurred or that work has been carried out incorporating defective materials, the [Contract Administrator] may have tests, inspections or surveys performed such as concrete core strength tests, analytical calculations of structural strength and the like in order to help determine whether the work must be replaced. Tests, inspections, calculations or surveys carried out under these circumstances will be made at the Contractor's expense, regardless of their results, which may be such that, in the Contract Administrator's opinion, the work may be acceptable.

.2 All testing shall be conducted in accordance with the requirements of the Building Code, except where this would, in the Contract Administrator's opinion, cause undue delay or give results not representative of the rejected material in place. In this case, the tests shall be conducted in accordance with the standards given by the Contract Administrator.

.3 Materials or work which fail to meet specified requirements may be rejected by the Contract Administrator whenever found at any time prior to final acceptance of the work regardless of previous inspection. If rejected, defective materials or work incorporating defective materials or work shall be removed and replaced or repaired to the satisfaction of the Contract Administrator promptly, at no expense to the City.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 All Division 1 Specification Sections

.2 Section 03 30 00 – Cast-in-Place Concrete

.3 Section 31 22 13 – Rough Grading

.4 Section 31 23 00 – Excavation and Backfill

.5 Section 31 23 10 – Excavating and Backfilling for Trenching

.6 Section 32 12 16 – Asphalt Paving

.7 Section 32 14 13 – Precast Concrete Unit Paving

.8 Section 32 16 00 – Curbs, Gutters and Sidewalks

.9 Section 32 94 51 – Soil Cells

.10 Geotechnical Report

1.2 References

.1 ASTM International

.1 ASTM C117-[17], Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C131-[14], Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.3 ASTM C136-[19], Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D698-[12e2], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft3) (600kN-m/m3).

.5 ASTM D1557-[12e1], Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft3) (2,700kN-m/m3).

.6 ASTM D1883-[16], Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.

.7 ASTM D4318-[17e1], Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.8 ASTM D6938-[17a], Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-[88], Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-[M88], Sieves, Testing, Woven Wire, Metric.

.3 City of Winnipeg Standard Specification CW3110

1.3 Delivery, Storage, And Handling

.1 Deliver and stockpile aggregates.

.2 Storage and Handling Requirements:

.1 Stockpile minimum 50% of total aggregate required prior to beginning operation.

.3 Processing

.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.

.2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified.

.3 Wash aggregates, if required to meet specifications.

.4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.

.4 Handling

.1 Handle and transport aggregates to avoid segregation, contamination and degradation.

.5 Stockpiling

.1 Stockpile aggregates on site in locations as indicated unless directed otherwise by the Contract Administrator. Do not stockpile on completed pavement surfaces.

.2 Stockpile aggregates in sufficient quantities to meet project schedule.

.3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300mm of pile into the Work.

.5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Landscape Architect within 48h of rejection.

.7 Stockpile materials in uniform layers of thickness as follows:

.1 Max 1.5m for coarse aggregate and base course materials.

.2 Max 1.5m for fine aggregate and sub-base materials.

.3 Max 1.5m for other materials.

.8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

.9 Do not cone piles or spill material over edges of piles.

.10 Do not use conveying stackers.

.11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

.12 Restore stockpile areas to pre-construction condition or as otherwise specified.

1.4 Waste Management and Disposal

.1 Divert unused granular materials from landfill to local facility, in accordance with local authorities having jurisdiction.

PART 2 – PRODUCTS

2.1 Materials

.1 Granular sub-base and base material will be in accordance with the City of Winnipeg's Standard Construction Specification CW 3110-R22 requirements:

.1 Crushed stone or gravel: hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials

.2 Unit Paving – Bedding and Joint Material:

.1 Bedding and joint sand: hard, durable, crushed stone particles, conforming to the gradation of concrete sand as specified in CAN/CSA A23.1.

.2 Do not use limestone screenings or stone dust for bedding or joint material.

.3 Gradation: to CAN/CSA-A23.1, Table I - Grading Limits for Fine Aggregate, and CSA A179 as follows:

Sieve Designation	% Passing Bedding Sand	% Passing Joint Sand
10 mm	100	-
5 mm	95-100	100
2.5 mm	80-100	95-100
1.25 mm	50-90	60-100
630 microns	25-65	-
315 microns	-	35-20
300 microns	10-35	-
160 microns	-	15-20
150 microns	-	2-15

.4 Jointing Sand: Polymeric sand – shall be free from clay lumps, cementation, organic material, frozen material, and other deleterious materials. Gradations: within limits specified when tested to ASTM C136 and ASTM C117.

.5 Colour: Grey

.3 Water:

.1 The Contractor shall supply water for the construction of granular base course. No direct payment will be made for water as this work will be considered incidental to the unit price for Surface Preparation or Granular Base Course.

PART 3 – EXECUTION

3.1 Placement and Installation

.1 Place granular materials after subgrade and sub-base surface are inspected and approved by the Contract Administrator in accordance with the Geotechnical Report.

.2 Placing:

.1 Construct granular base to depth and grade in areas on Drawings.

.2 Ensure no frozen material is placed.

.3 Place material only on clean unfrozen surface, free from snow and ice.

.4 Begin spreading base material on crown line or on high side of one-way slope.

.5 Place material using methods which do not lead to segregation or degradation of aggregate.

.6 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.

.7 Place material to full width in uniform layers not exceeding 150mm compacted thickness.

.1 Contract Administrator may authorize thicker lifts (layers) if specified compaction can be achieved.

.8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.9 Remove and replace that portion of layer in which material becomes segregated during spreading.

.3 Compaction Equipment:

.1 Ensure compaction equipment is capable of obtaining required material densities.

.2 Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from Contract Administrator before use.

.3 Equipped with device that records hours of actual work, not motor running hours.

.4 Compacting:

.1 Compact to density not less than 100% maximum dry density.

.2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

.3 Apply water as necessary during compacting to obtain specified density.

.4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved in writing by Contract Administrator.

.5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

.5 Proof rolling:

.1 Where proof rolling reveals areas of defective subgrade:

.1 Remove base, sub-base and subgrade material to depth and extent as directed by Contract Administrator.

.2 Backfill excavated subgrade with sub-base material and compact to 95% SPD using non-vibratory equipment.

.3 Replace sub-base material and compact to 100% SPD.

.4 Replace unsuitable base material and compact in accordance with granular material compacted to 98% SPD.

.2 Where proof rolling reveals defective base or sub-base, remove defective materials to depth and extent as directed by Contract Administrator and replace with new materials in accordance with this section at no extra cost.

3.2 Site Tolerances

.1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.3 Protection

.1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Contract Administrator.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 Section 32 11 23 – Aggregate Base Courses

.2 Section 32 17 23 – Pavement Markings

1.2 References

.1 City of Winnipeg Standard Construction Specification CW 3410 Asphaltic Concrete Pavement Works.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1, Sieves Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2, Sieves Testing, Woven Wire, Metric.

.3 CAN/CGSB-16.1, Cutback Asphalts for Road Purposes.

.3 American Association of State Highway and Transportation Officials (AASHTO)

.1 AASHTO M320 - 2022 - Standard Specification for Performance Grade Asphalt Binder.

.4 American Society for Testing and Materials International, (ASTM)

.1 ASTM C88M-18, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.

.2 ASTM C117-17, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.3 ASTM C123/C123M-14, Standard Test Method for Lightweight Particles in Aggregate. *

.4 ASTM C127-15, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.

.5 ASTM C128-22, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.

.6 ASTM C131/C131M-20, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.7 ASTM C136/C136M-19, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

.8 ASTM D698-12 (2021), Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3) (600 kN-m/m3).

.9 ASTM D977-20 – Standard Specification for Emulsified Asphalt.

.10 ASTM D995, Standard Specification for Requirements Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures. *

.11 ASTM D2419-22, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

.12 ASTM D3203-22, Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.

.13 ASTM D4318-17e1, Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.14 ASTM D4791-19, Standard Test Method for Flat Particles or Elongated Particles in Coarse Aggregate.

.5 Asphalt Institute (AI)

.1 Asphalt Institute MS-2-1993 Sixth Edition, Mix Design Methods for Asphalt Concrete.

1.3 Product Data

.1 Submit asphalt mix design for review by the Contract Administrator in accordance with Section 01 33 00 – Submittal Procedures.

1.4 Quality Control

.1 One Marshall Stability Test, one extraction test and sieve analysis of extracted material to be carried out on the Asphaltic Plant mix for each 1,000 tonnes of production, but not less than one each day of production.

.2 One density and thickness recorded for each 1,000 m^2 placed, including each location at which an extraction for a Marshall Stability Test on the mixture has been performed.

PART 2- PRODUCTS

2.1 Materials

.1 Aggregates: conforming to the latest edition of City of Winnipeg Standard Construction Specification CW 3410 Asphaltic Concrete Pavement Works.

.2 Asphalt Cement: conforming to the latest edition of City of Winnipeg Standard Construction Specification CW 3410 Asphaltic Concrete Pavement Works.

.3 Mineral Filler: conforming to the latest edition of City of Winnipeg Standard Construction Specification CW 3410 Asphaltic Concrete Pavement Works.

.4 Prime Coat and Tack Coat: consisting of either an emulsified or cutback asphalt. Selection shall be based upon field conditions and subject to approval of the Contact Administrator.

PART 3- EXECUTION

3.1 Preparation

.1 Prepare granular base in accordance with Section 32 11 23 – Aggregate Base Courses.

.2 Placement of asphaltic concrete paving mixture shall not occur until the construction of the granular base has been completed and the Contract Administrator has approved the condition and grade of the granular base.

3.2 Pavement

.1 Complete placement of asphaltic concrete pavement in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 3410 Asphaltic Concrete Pavement Works.

3.3 Defective Work

.1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form a true and even surface and compact immediately to specified density.

.2 Repair areas showing checking, hairline cracking, rippling or segregation.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 All Division 1 Specification Sections
.2 Section 31 32 21 – Geotextiles
.3 Section 32 11 23 – Aggregate Base Courses

1.2 References

.1 American Society for Testing and Materials (ASTM):
  .1 Current ASTM C117, Test Method for Material Finer Than 75-[mu] m (No.200) Sieve in Mineral Aggregates by Washing.
  .2 Current ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  .3 Current ASTM C902, Specification for Pedestrian and Light Traffic Paving Brick.
  .4 Current ASTM C979-16, Standard Specification for Pigments for Integrally Coloured Concrete.
  .5 Current ASTM D698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort(600kN-m/m^3).
  .6 Current ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700kN-m/m^3).

.2 Canadian Standards Association (CSA):
  .1 Current CSA A23.1/A23.2, Concrete Materials and Methods of Construction, Section 5.3.2./ Method of Test for Concrete.
  .2 Current CSA A179, Mortar and Grout for Unit Masonry.
  .3 Current CSA-A231.2, Precast Concrete Pavers.
  .4 Current CSA A283, Qualification Code for Concrete Testing Laboratories.

1.3 Product Data

.1 Submit following test data:
  .1 Sieve analysis for gradation of bedding and joint material.
  .2 Unit paver test data.

1.4 Shop Drawings

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Indicate layout, pattern and relationship of paving joints to fixtures and project formed details.

1.5 Samples

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit full size sample of each type of paving unit.

PART 2 – PRODUCTS

2.1 Materials

.1 Granular base as indicated on drawings and as per Section 32 11 23 Aggregate Base Courses.

.2 Unit pavers to conform to applicable details.

.3 Unit pavers: uniform in material, colour, size and from one manufacturer as follows:

.1 Unit Paver (in plaza):

.1 Product: Holland

.2 Colour 01: Natural
Colour 02: Graphite
Colour 03: Sierra Grey
Colour 04: White (Premium Colour)
Refer to drawings for layout/ colour pattern.

.3 Size: 210x105x60mm

.4 Manufacturer: Barkman
Contact: August Wiens
1-204-667-3310

.2 Unit Paver (unit banding along pedestrian pathways):

.1 Product: Holland

.2 Colour 01: Sierra Grey
Colour 02: Graphite

.3 Size: 210x105x60mm

.4 Manufacturer: Barkman
Contact: August Wiens
1-204-667-3310

.3 Unit Paver (at raised crossings in parking areas and center median at childcare drop-off loop):

.1 Product: Holland

.2 Colour 01: Sierra Grey
Colour 02: Graphite

.3 Size: 210x105x80mm

.4 Manufacturer: Barkman
Contact: August Wiens
1-204-667-3310

.4 Geotextile: Refer to Section 31 32 21 and CW3130

2.2 Bedding and Joint Material

.1 Bedding and joint sand as per Section 32 11 23 Aggregate Base Courses.

2.3 Cleaning Compound

.1 Clear, organic solvent, designed, recommended, and approved by manufacturer for cleaning concrete pavers of contamination encountered.

.2 Acid based chemical detergent, designed, recommended, and approved by manufacturer for removal of contamination encountered on pavers.

2.4 Sealing Compound

.1 Clear acrylic or urethane, exterior type, water based, specially formulated for application on precast concrete pavers.

.2 Clear solvent based acrylic or urethane exterior type, containing co-polymer resins specially formulated for application on precast concrete pavers.

PART 3 – EXECUTION

3.1 Subgrade

.1 Set out work to lines and levels shown on Drawings. Gain approval from the City and/or Contract Administrator of lines and levels prior to sub-base installation. Maintain such lines and levels for duration of work.

.2 Excavate and prepare all subgrade as noted on details. Remove and dispose of existing unsuitable subgrade materials off site.

.3 Verify grades of subgrade for conformity with elevations and sections before placing base material.

.4 Disturbed subgrade or clean fill shall be compacted to 98% of Standard Proctor Density in accordance with ASTM D698-70.

.5 Obtain subgrade and sub-base approval from the City and/or Contract Administrator prior to placing base material.

3.2 Granular Base

.1 Exercise caution at all times to prevent base material from becoming contaminated by clay or other deleterious materials.

.2 Place base material to compacted thickness as indicated on drawings.

.3 Place in layers not exceeding 150mm compacted thickness. Compact to density not less than 98% of Standard Proctor Density in accordance with ASTM D698-70.

.4 The granular base surface shall be rolled continuously, compacted, and bladed as necessary.

.5 Verify that top of granular surface does not exceed plus or minus 10 mm of grade over 3 m straightedge.

.6 Gain approval from the Contract Administrator of the installed granular base. Installation of unit pavers can only commence after granular base test results confirm that the specified compaction has been achieved.

3.6 Bedding Sand

.1 Place and spread bedding and compact sand as detailed on drawings.

.2 Ensure bedding material is not saturated or frozen at all times until installation is complete.

.3 Spread and screed material on structural surface to achieve compacted thickness after vibrating pavers in place as detailed on drawings. Do not use joint sand for bedding sand.

3.7 Surface Course

.1 Ensure bedding sand and granular base are not saturated prior to placement of unit pavers.

.2 Install unit paving true to grade on the bedding sand, in location, layout and pattern as indicated.

.3 Where required, cut units accurately without damaging edges.

.4 Precast concrete pavers:
- .1 Install unit paving with minimum joint width as detailed on drawings.
- .2 Use cut pieces no smaller than one-third of a whole paver.
- .3 Compact and level pavers with min. 22 kN force mechanical plate vibrator use minimum 19 mm thick plywood or neoprene pad under plate compactor until pavers are true to grade and free of movement.
- .4 Fill spaces between pavers by sweeping in sand.
- .5 Pass mechanical plate vibrator over unit paving to achieve compaction of sand in joints. Ensure joints are full at completion of compaction.
- .6 At the completion of each work day, ensure all work within 1 m of laying face is left fully compacted with sand filled joints.
- .7 Surface of finished pavement: free from depressions exceeding 3 mm as measured with 3 m straight edge.
- .8 Sweep surface clean and check final elevations for conformance to drawings.

.5 Lay pavers to pattern indicated on drawings. Joints between pavers as detailed on drawings.

.6 Use appropriate end, edge and corner stones. Saw cut pavers to fit around obstructions and at abutting structures.

.7 Installation by mechanical equipment:
- .1 Prepare installation sequence to maximize project efficiency.
- .2 Place paver pallets and other materials without exceeding load bearing capacity, or otherwise detrimentally affecting installations.
- .3 Run equipment approved for installation only on paving surfaces vibrated in place.

.8 Use a low amplitude, high frequency plate compactor capable of at least 22 kN centrifugal compaction force to vibrate pavers into bedding sand.

.9 Inspect, remove, and replace chipped, broken and damaged pavers. Replace pavers removed without altering layout and structural quality.

.10 Sweep dry joint sand material into joints.

.11 Settle sand by vibrating pavers with plate compactor.

.12 Continue application of joint material and vibrating of pavers until joints are full.

.13 At the completion of each work day, ensure all work within 1 m of laying face is left fully compacted with sand filled joints.

.14 Sweep off excess joint material when installation is complete.

.15 Final surface elevations not to exceed plus or minus 3 mm under 3 m long straightedge.

.16 Surface elevation of pavers: maximum 3 mm above adjacent drainage inlets, concrete collars or channels.

.17 Ensure conformance of final elevations.

3.8 Cleaning

.1 Carry out cleaning at times and conditions recommended by manufacturer of cleaning compound immediately prior to sealing.

.2 Remove and dispose of loose, extraneous materials from surfaces to be cleaned.

.3 Apply cleaning compounds appropriate for removal of various contaminants encountered in accordance with manufacturer's recommendations.

.4 Final surface to be free of contamination.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 Section 31 22 13 – Rough Grading

.2 Section 32 11 23 – Aggregate Base Courses

.3 Section 32 14 13 – Precast Concrete Unit Paving

1.2 References

.1 ASTM C94/C94M-09 - Ready-Mixed Concrete.

.2 ASTM C260-06 - Air-Entraining Admixtures for Concrete.

.3 ASTM D1751-04(2008) - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

.4 ASTM D1752-04a(2008) - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

.5 CSA-A23.1-09/A23.2-09 - Concrete Materials and Methods of Concrete Construction / Methods of Test for Concrete.

.6 CAN/CSA-A3000-08 - Cementitious Materials Compendium.

.7 CSA-G30.18-09 – Carbon Steel Bars for Concrete Reinforcement.

.8 CAN/CSA-S269.3-M92 (R2008) - Concrete Formwork.

.9 CSA-W186-M1990 (R2007) - Welding of Reinforcing Bars in Reinforced Concrete Construction.

.10 Canada Green Building Council (CaGBC)

.1 LEEDv4 Canada-BD+C [2013], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package New Construction and Major Renovation.

.2 LEEDv4 Canada-BD+C [2013], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package Core and Shell Development.

.3 LEEDv4 Canada-ID+C [2013], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

.4 LEEDv4 Canada fO+M [2013], LEED (Leadership In Energy and Environmental Design): Green Building Rating System Reference Guide Existing Buildings, Operations and Maintenance.

.11 City of Winnipeg Standard Construction Standard Specification

.1 CW3310 – Portland Cement Concrete Pavement Works

.2 CW3325 – Portland Cement Concrete Sidewalk

1.3 Submittals

.1 Product Data: Provide data on joint filler, admixtures and curing compounds.

1.4 Mock-ups

.1 Construct mock-up in accordance with general requirements.

.2 Stencil for Sandblast Pattern:

.1 Provide one (1) full size stencil for approval in accordance with the project requirements. Sandblast pattern files to be provided by the Contract Administrator.

.3 Install: a mock-up of each of the following concrete finishes

.1 1.5 m x 1.5 m area of concrete paving with heavy-sandblast finish and expansion joints.

.2 1.5 m x 1.5 m area of concrete paving with fine broom finish and expansion joints.

.4 Mock-up area will be used to determine joint sizes, lines, colour and finishing texture.

.5 Acceptance of work will be determined by the Contract Administrator.

1.5 Quality Assurance

.1 Materials testing required shall include laboratory and field testing in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 3310 – Portland Cement Concrete Pavement Works.

PART 2- PRODUCTS

2.1 Materials

.1 Concrete mixes and materials: in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 3310 – Portland Cement Concrete Pavement Works.

.2 Reinforcing steel: in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 3310 – Portland Cement Concrete Pavement Works.

.3 Curing compound: in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 3310 – Portland Cement Concrete Pavement Works.

.4 Form release agent: in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 3310 – Portland Cement Concrete Pavement Works.

.5 Tools and equipment: The Contractor shall furnish all materials, stencils for sandblast patterns, tools, equipment, facilities and services required for performing the required concrete finishing work.

PART 3- EXECUTION

3.1 Examination

.1 Verify compacted granular base is acceptable to support paving and imposed loads.

.2 Verify grades and elevations are correct, to the satisfaction of the Contract Administrator.

3.2 Preparation

.1 Perform grade preparation work in accordance with Section 31 23 17 Excavating and Backfilling for trenching and Section 31 22 13 Rough Grading.

.2 Moisten base to minimize absorption of water from the concrete into the granular base.

.3 Notify the Contract Administrator a minimum of twenty-four (24) hours prior to commencement of concreting operations.

3.3 Forming

.1 Place and secure forms to correct location, dimension, profile and gradient.

.2 Assemble formwork to permit easy stripping and dismantling without damaging concrete.

.3 Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.4 Reinforcement

.1 Place reinforcing steel as indicated.

.2 Interrupt reinforcement at expansion joints.

.3 Place dowels to achieve pavement and curb alignment as detailed.

.4 Provide dowelled joints (at 300 mm on centre) at joints where existing pavement meets new pavement.

3.5 Placing Concrete

.1 No concrete shall be placed until the Contract Administrator has examined and approved the layout of the forms, reinforcing steel, dowels, tie bars and joints and the condition and grade of the compacted base course.

.2 Place concrete in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 3310 – Portland Cement Concrete Pavement.

.3 Finish concrete in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 3310 – Portland Cement Concrete Pavement.

3.6 Joints

.1 Place expansion joints at 6 m intervals. Align curb, gutter and sidewalk joints.

.1 Where joint locations are specified in the landscaping plans, follow joint configuration shown on the plans.

.2 Place joint filler between paving components and building or other appurtenances. Recess top of filler 6 mm for sealant placement in accordance with Section 07 02 00. Install joint filler in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 3310 – Portland Cement Concrete Pavement.

.3 Saw cut contraction joints 5 mm wide at an optimum time after finishing. Cut one third (1/3) into depth of slab.

.4 Seal isolation joints with sealant approved by the Contract Administrator.

3.7 Finishing

.1 All exposed vertical surfaces of concrete to be architectural grade with a totally smooth finish, free of air pockets, stains, roughness, chipped corners, etc.

.2 Pavements, walkways and exposed site concrete: screed to plan surfaces and float using aluminum, magnesium or wood floats. Round edges and provide joint spacing using standard tools. Trowel smooth followed by fine broom non-slip finish.

.3 Direction of Texturing: Transverse to pavement direction.

.4 Concrete paving on drawings indicated as “Sandblast finish” to be troweled smooth, followed by a heavy sandblast non-slip finish.

.1 Surfaces shall be blasted using abrasive achieving an even and uniform exposure of aggregate.

.2 Sandblasted surfaced shall have uniform depth of cut-back, distribution of aggregate and colour and texture matching the sample accepted by the Contract Administrator.

.3 Individual concrete members shall be sandblasted at the same age to ensure reasonable colour uniformity.

.5 Place curing compound on exposed surfaces immediately after finishing. Apply to manufacturer’s written instructions.

.6 Tolerances

.7 Maximum Variation of Surface Flatness: 6 mm in 3 m.

.8 Maximum Variation from True Position: 6 mm.

3.8 Protection

.1 Protect concrete in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 3310 – Portland Cement Concrete Pavement.

3.9 Backfilling

.1 Backfill concrete in accordance with City of Winnipeg Standard Construction Specification CW 3310 – Portland Cement Concrete Pavement.

.2 Allow concrete to cure for 7 days prior to backfilling.

.3 Backfill to designated elevations with material approved by the Contract Administrator.

END OF SECTION

PART 1 – GENERAL

1.1 Related Work

.1 All Division 1 Specification Sections.
.2 Section 32 12 16 – Asphalt Paving

1.2 References

.1 Current CAN/CGSB-1.5, Low Flash Petroleum Spirits Thinner.
.2 Current CGSB1-GP-12c, Standard Paint Colours.
.3 Current CGSB1-GP-71, Method, of Testing Paints and Pigments.
.4 Current CGSB1-GP-74M, Paint, Traffic, Alkyd.
.5 City of Winnipeg Standard Specification CW3410 Asphaltic Concrete Pavement Works

1.3 Samples

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit to the Contract Administrator the following material sample quantities at least 2 weeks prior to commencing work.
  .1 One 500ml samples of each type of paint.
  .2 Sampling to CGSB1-GP-71.

.3 Mark samples with name of project and its location, paint manufacturer's name and address, name of paint, CGSB specification number and formulation number and batch number.

PART 2 – PRODUCTS

2.1 Materials

.1 Pavement marking and materials to conform to applicable details.

.2 Paint:
  .1 To CGSBI-GP-74M, alkyd traffic paint.
  .2 Colour: White, Yellow, and Blue

.3 Thinner:
  .1 To CAN/CGSB-1.5.

PART 3 – EXECUTION

3.1 Equipment Requirements

.1 Paint applicator to be an approved pressure type mobile distributor capable of applying paint in single, double and dashed lines. Applicator to be capable of

applying marking components uniformly and to dimensions as indicated, and to have positive shut-off.

3.2 Condition of Surfaces

.1 Pavement surface to be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.

3.3 Application

.1 Lay out Lay out parking stall lines and accessible parking symbols as indicated on the Drawings. Obtain Contract Administrator's approval prior to painting.

.2 Apply paint only when air temperature is above 10ºC, wind speed is less than 60km/h and no rain is forecast within next 4h.

.3 Symbols and letters to conform to dimensions indicated.

.4 Paint lines to be of uniform colour and density with sharp edges.

.5 Thoroughly clean distributor tank before refilling with paint of different colour.

3.4 Tolerance

.1 Paint markings to be within plus or minus 10mm of dimensions indicated.

3.5 Protection of Completed Work

.1 Protect pavement markings until dry.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 Section 32 12 16 - Asphalt Paving

.2 Section 32 16 00 – Curbs, Gutters and Sidewalks

1.2 References

.1 ADA Accessibility Guidelines (ADAAG)

.2 City of Winnipeg Accessibility Standards.

.3 City of Winnipeg Standard Specifications CW 3326 Detectable Warning Surface Tiles

1.3 Quality Assurance

.1 Installer Qualifications: Experienced installer, certified in writing by tactile warning surface manufacturer, who has successfully completed tactile warning surface installations similar in material, design, and extent to work in project.

1.4 Project Conditions

.1 Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

.2 Weather Limitations for Adhesive Application: Apply adhesive only when ambient temperature is above 50 deg F (10 deg C) and when temperature has not been below 35 deg F (2 deg C) for 12 hours immediately before application. Do not apply when substrate is wet or contains excessive moisture.

.3 Weather Limitations for Mortar and Grout:

.4 Cold-Weather Requirements: Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

.5 Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Provide artificial shade and windbreaks, and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and higher.

.1 When ambient temperature exceeds 100 deg F (38 deg C), or when wind velocity exceeds 8 mph (13 km/h) and ambient temperature exceeds 90 deg F (32 deg C), set unit pavers within 1 minute of spreading setting-bed mortar.

PART 2 – PRODUCTS

2.1 Tactile Warning Surfacing, General

.1 Accessibility Requirements: Comply with applicable provisions in Manitoba for tactile warning surfaces.

.2 For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.

2.2 Detectable Warning Tiles

.1 Cast Iron Detectable Warning Tiles: Accessible truncated-dome detectable warning tiles configured for setting flush in new concrete walkway surfaces, ramps, or new construction with slip-resistant surface treatment on domes and field of tile.

.1 Tactile Warning Tile at Curb Ramps and along Drop-Off Area:

.1 2'x 4' (610 x 1220mm) Armor-Tile Cast in Place (yellow) available from:

Alsip's Building Products; 1 Cole Avenue, Winnipeg, Manitoba, Ph. 204.667.3330.

or

Brock White Canada; 879 Keewatin Street, Winnipeg, Manitoba, Ph. 204.479.8089

.2 Detectable warning surfaces tiles shall be Highway Yellow (USA) or Safety Yellow (Canada).

.3 Truncated domes on detectable warning surface tiles shall be in accordance with ADA Accessibility Guidelines (ADAAG).

.2 Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined, and complying with the following:

.1 Furnish color appropriate nylon sleeve, stainless-steel fasteners for exterior use.

.2 Fastener Heads: For non-structural connections, use flathead or oval countersunk screws and bolts with tamper-resistant heads, colored to match tile.

.3 Adhesive: As recommended by manufacturer for adhering tactile warning surfacing unit to substrate.

.4 Sealant: As recommended by manufacturer for sealing perimeter of tactile warning surfacing unit.

PART 3 – EXECUTION

3.1 Examination

.1 Verify that surface is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.

3.2 Installation

.1 Refer to CW 3326 Detectable Warning Surface Tiles

3.3 Tactile Warning Pavers

.1 Concrete Installation: Comply with installation requirements in Section 32 16 00 – Curbs, Gutters and Sidewalks. Mix, place, and finish concrete to conditions complying with detectable warning tile manufacturer's written requirements for satisfactory embedment of removable tile.

.2 Paver Installation: Follow manufacturer's detailed installation guidelines

.3 All grout and mortar to be exterior grade

.4 To the maximum extent possible, the pavers shall be oriented such that the rows of in-line truncated domes are parallel with the direction of the path. When multiple Cast in Place Replaceable Tiles regardless of size are used, the truncated domes shall be aligned between the tactile warning surface tiles and throughout the entire tactile warning surface installation.

.5 Clean and seal pavers using methods recommended in writing by manufacturer.

3.4 Cleaning and Protection

.1 Protect detectable warning tiles against damage during construction period to comply with tile manufacturer's specifications.

.2 During and after the detectable warning tiles installation and the concrete curing stage, it is imperative that there are no walking, leaning, or external forces placed on the tile to rock the tile, causing a void between the underside of the tile and the concrete substrate.

.3 Remove protective plastic sheeting from detectable warning tiles within 24 hours of installation.

.4 Clean tiles not more than four days prior to date scheduled for inspection intended to establish date of substantial completion in each area of the project.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 All Division 1 Specification Sections
.2 Section 03 30 00 – Cast-in-Place Concrete
.3 City of Winnipeg Standard Specification 3550
.4 City of Winnipeg Standard Specification 2160

1.2 References

.1 American Society for Testing and Materials International, (ASTM).
  .1 ASTM A53/A53M-02, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  .2 ASTM A90/A90M-01, Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
  .3 A653/A653M-03, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  .4 ASTM C618-03, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.

.2 Canadian Standards Association (CSA International).
  .1 CAN/CSA-A23.1/A23.2-00 (August 2001), Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
  .2 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
  .3 CAN/CSA-A3000-98 (R2002), Cementitious Materials Compendium. Includes:
    .1 CAN/CSA-A23.5-98, Supplementary Cementing Materials
  .4 Department of Justice Canada (Jus)
    .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
  .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
    .1 Material Safety Data Sheets (MSDS).
  .6 Transport Canada (TC).
    .1 Transportation of Dangerous Goods Act (TDGA), 1992, c.34.

1.3 Submittals

.1 Submit final assembly drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings are to be submitted for all fencing and gates.

1.4 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Construction and Demolition Waste Management.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 – PRODUCTS

2.1 Materials

.1 Chain-link fence fabric: to CAN/CGSB-138.1.

.1 Type 1, Steel Fabric; Class A, Zinc-Coated Galvanized after weaving (GAW); Style 2, Medium, 3.5mm; Grade 2, Galvanizing thickness.

.2 Mesh size: 50mm

.3 Height of fabric: 1525mm.

.4 Color: Black

.2 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe Type 1. Dimensions as indicated on drawing.

.1 Terminal posts shall extend from ground to ceiling above. Outside pipe diameter minimum 88.9 mm. Refer to Table 1 of Specification CW3550.

.2 Line posts shall be standard seamless, continuous weld, schedule 40 hot dip galvanized steel pipe weighing 5.43 kg per lineal metre. Line posts for fence fabric that is to be 3660 mm and higher shall weigh 8.63 kg per lineal metre. Tubing, conduit or open seam pipe will not be accepted. Line posts shall be supplied with weatherproof eye top caps to accommodate continuous horizontal top rail and shall be of the lengths and dimensions shown in Table 2 of Specification CW3550.

.3 Rail outside diameter to be 42.2 mm minimum.

.3 Top and bottom tension wire: to CAN/CGSB-138.2, single strand, galvanized steel wire.

.4 Tie wire fasteners: steel wire.

.5 Tension bar: to ASTM A653/A653M, 5 x 20 mm minimum galvanized steel.

.6 Fabric:

.1 Fabric shall be No. 9 gauge steel wire woven into a uniform 50 mm (2") diamond pattern mesh or as specified. Size of mesh shall be determined by measuring the minimum clear distance between the wires forming the parallel sides of the mesh. Permissible variation in size of mesh shall be 3 mm (1/8"). Diameter of wire shall be no less than 3.68 mm (0.145"). The top and bottom selvage shall be knuckled.

.2 Fabric shall be zinc coated before weaving by the hot dip process to an average mass per unit area of not less than 490 g/m2.

.3 Mesh fabric shall not be excessively rough, or have blisters, sal ammoniac spots, bruises or flaking.

.4 Chain link fabric shall have a minimum tensile strength of 415 MPa.

.7 Gate between play area (Gate Type 01), Qty. 1: to CAN/CGSB-138.4.

.1 Gates shall swing as shown on drawings.

Gate latch: Fork latch, Colour: Black

Gate frame: to ASTM A53/A53M, galvanized steel pipe, standard weight 45mm outside diameter pipe for outside frame, 35mm outside diameter pipe for interior bracing.

.2 Fabricate gate with electrically welded joints, and hot-dip galvanized after welding.

.3 Fasten fence fabric to gate with twisted selvage at top.

.8 Gate located on perimeter of fenced play areas (Gate Type 02), Qty. 2– Refer to Drawings:

.1 Gate Sizing: 5’ wide x 7’ high chainlink gate, Refer to Drawings

.2 Colour: Black

.3 Gate Components (or approved alternate):

.1 Self-Closing Hinges –

Product: Locinox mammoth self-closing hinges

Colour: Black

.2 Panic Bar and Reach Thru Guard -

Product: DAC Industries 6040 Deluxe Exit Bar Kit located on interior of play area

Colour: Black

.3 Exterior Handle –

Product: Simplex 1000 Series Cylindrical Keyed Lock located on exterior of gate.

.4 Supplier: Wallace Fences

.5 Contact Information: Ben Saunders bsaunders@wallacefences.com
90 Lowson Crescent, Winnipeg, MB, R3P 2H8
t: 866.300.1110 f: 204.284.1868

.9 Fittings and hardware: to CAN/CGSB-138.2, galvanized steel.

.1 Tension bar bands: 3 x 20 mm minimum galvanized steel or 5 x 20 mm minimum aluminum.

.2 Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail.

.3 Overhang tops to provide waterproof fit, to hold top rails.

.4 Turnbuckles to be drop forged steel according to ASTM A27M and shall be galvanized according to CSA G154M.

.10 Concrete

.1 Where concrete piles are specified for post installation, the concrete shall conform to CW 2160 and be sulphate resistant type 50, minimum compressive strength of 25 MPa at 28 days, air content of 4% - 7%, maximum slump of 80 mm and a maximum size of course aggregate of 40 mm.

2.2 Setting Grout

.1 Concrete: Minimum 20 MPa. Refer to Section 03 30 00 – Cast-in-Place Concrete.

.2 Grout: Premixed, factory packaged, nonstaining, noncorrosive grout. Refer to Section 03 30 00– Cast-in-Place Concrete. Provide type especially formulated for exterior application.

2.3 Finishes

.1 Galvanizing: For chain link fabric: to CAN/CGSB-138.1 Grade 2.

PART 3 – EXECUTION

3.1 Grading

.1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.

.1 Provide clearance between bottom of fence and ground surface of 30mm to 50mm.

3.2 Erection Of Fence and Gates

.1 Erect fence along lines as indicated and to CAN/CGSB-138.3.

.2 Install end posts at end of fence and at buildings.

.3 Install brace between end posts and nearest line post.

.1 Install braces on both sides of corner and straining posts in similar manner.

.4 Install top rail between posts and fasten securely to posts and secure waterproof caps.

.5 Space at bottom of fence to be flush with grade of play area.

.6 Install all gates level and secure for full openings, without interference. Adjust and lubricate all gate hardware for smooth and efficient operation.

.7 Refer to manufacturer installation guidelines.

3.3 Touch Up

.1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas.

3.4 Cleaning

.1 Clean and trim areas disturbed by operations.

.2 Dispose of surplus material as directed by Contract Administrator

END OF SECTION

PART 1 – GENERAL

1.1 Related Work

.1 Section 03 30 00 – Cast-in-Place Concrete

1.2 Product Data

.1 Submit product data as per Submittal Procedures.

1.3 Shop Drawings

.1 Submit shop drawings as indicated on Drawings and as per Submittal Procedures.

.2 Submit shop drawings showing layout of benches mounted on concrete seat wall (Bench Type 02) in plaza for approval.

.3 Submit Engineer stamped shop drawings for custom fabrication work.

.4 Indicate dimensions, sizes, assembly, anchorage finishes, colours and installation details for each product specified.

.5 Include erection drawings, elevations, and details.

.6 Ensure dimensions indicated on shop drawings are based on field measurements.

1.4 Samples

.1 Provide sample of finishes for all furnishings.

1.5 Design Requirements

.1 Design, Fabricate and Install site furnishings and base mounting plates as indicated on drawings and in accordance with manufacturer's recommendations.

.2 Design details and connections where not shown on drawings in accordance with CAN/CSA-S16.1 and CSA S136.1

.3 Verify that site furnishings can accommodate all required live, dead, lateral, wind, seismic, handling, transportation and erection loads.

1.6 Closeout Submittals

.1 Provide maintenance data for care and cleaning of all products for incorporation into the maintenance manual.

PART 2 – PRODUCTS

2.1 Materials

.1 Site Furnishings in Plaza:

.1 Benches mounted on Concrete Seat Wall (Bench Type 02) :

.1 Product: Vestre Vroom 620MKL3 for Wall Top, Qty. 12
Vestre Vroom Backrest 629, Qty, 12
Vestre Vroom 630MKL D5 for Wall Top, Qty. 6
Vestre Vroom Backrest for 630MKL D5 benches, Qty, 6
Vestre Vroom 624MK Armrests, Qty. 32 (for all benches above)
Quantities above to be verified with Landscape Drawings.

Material: Galvanized and Powder coated steel (Colour TBC)
Linseed oil proofed Nordic pine

Spare Parts: Qty. 24 – Wood Slats (seat)
Qty. 24 – Wood Slats (back)
Qty.6 – Armrests

Mounting: Mounted to concrete seat wall

Contact: Vestre
Emmanuelle Bourlier
E. emmanuelle@vestre.com
P. (310) 650-6769

.2 Seating Islands at Table Tennis Area:

.1 Product: Seating Island Type 01
3612 Stripes Circle Bench Small (or approved equal)
Refer to Landscape Drawings.

Material: Galvanized and Powder coated steel (Colour TBC)
Linseed oil proofed Nordic pine

Size: 1252mm diameter x 415mm

Mounting: Surface mounted to concrete paving with tamper-proof hardware

Contact: Vestre
Emmanuelle Bourlier
E. emmanuelle@vestre.com
P. (310) 650-6769

.2 Product: Seating Island Type 02
3617 Stripes Bench Semicircle Closed (or approved equal)
Refer to Landscape Drawings.

Material: Galvanized and Powder coated steel (Colour TBC)
Linseed oil proofed Nordic pine

Size: 1780mm x 886mm x 415mm

Mounting: Surface mounted to concrete paving with tamper-proof hardware

Contact: Vestre
Emmanuelle Bourlier

E. emmanuelle@vestre.com
P. (310) 650-6769

.3 Waste Receptacles in plaza:

.1 Product: Vestre Bloc Litter Bin 1544L, 37 Gallons with Liner
(or approved equal)
Refer to Landscape Drawings.

Material: Galvanized and Powder coated steel (Colour TBC)

Spare Parts: 1 Replacement Liner for each bin

Sizing: 37 Gallons

Mounting: Surface mounted to concrete paving with tamper-proof hardware

Contact: Vestre
Emmanuelle Bourlier
E. emmanuelle@vestre.com
P. (310) 650-6769

.4 Picnic Tables in central area of plaza:

.1 Product: Vroom Backless Bench Straight End, 607-900, Qty. 6
Vroom Backless Bench Straight End, 905mm Custom length for Accessibility, Qty. 2
Vroom Table, 636-900, Qty. 4
(or approved equal)
Quantities above to be verified with Landscape Drawings.

Material: Galvanized and Powder coated steel (Colour TBC)
Linseed oil proofed Nordic pine slats

Spare Parts: Qty. 18 – Wood Slats (table)
Qty. 40 – Wood Slats (bench)

Mounting: Surface mounted to concrete paving with tamper-proof hardware.

Contact: Vestre
Emmanuelle Bourlier
E. emmanuelle@vestre.com
P. (310) 650-6769

.5 Round Table Seating:

.1 Product: Orbit Table LOB240, Qty. 1
Orbit Accessible Table LOW260, Qty, 2
(or approved equal)
Quantities above to be verified with Landscape Drawings.

Material: Cast aluminum structure

Mounting: Surface mounted to concrete paving with tamper-proof hardware

Colour (Frame): RAL colours to be confirmed

Contact: Makr Group
Cael Sullivan
E. Cael.Sullivan@makrgroup.com
P. 604 940 0067 ext. 210

.6 Tree Grates and Guards:

.1 Product: Jamison 2000 Tree Grate

Any Street Tree Guard with no laser cut
(or approved equal)
Refer to Landscape Drawings.
Material: Tree Grate - Iron Rust Converter
Tree Guard – to match tree grates
Size: Tree Grate – 2438mm x 2438mm Easy Knockout
Tree Guard – 1524mm
Contact: Makr Group
Cael Sullivan
E. Cael.Sullivan@makrgroup.com
P. 604 940 0067 ext. 210

.7 Table Tennis:
.1 Product: Accessible Table Tennis / Ping Pong Table with secured cabinet, Refer to Landscape Drawings.
(or approved equal)
Material: Aluminum, Colour for table and net TBC
Mounting: Surface mounted to concrete paving with tamper-proof hardware
Size: 108” x 59.25” x 30”
Contact: Riel Gregory, Shape Industries, gregoryr@shapeinc.com

.8 Jump Touch Station in Plaza (near table tennis area):
.1 Product: Landscape Structures, Model CP039269 Jump Touch Station Double Sided Unit (or approved equal)
Material: Proshield and Recycled Permalene, Colors TBC
Mounting: Direct bury in concrete footing
Contact: Tracy Drake, Playgrounds-r-us, tracy@pru.ca

.9 Shade Structure:
.1 Product: Icon Custom Shade Structure, Monoslope Shelter
Refer to Landscape Drawings.
Material: Steel structure, laser cut perforation pattern on roof panels to be coordinated and provided by Contract Administrator.
Mounting: Anchored to concrete piles
Colour: Powdercoated in 2 colours (Colours TBC)
Size: Refer to Landscape Drawings
Contact: Park N Play Design, Icon Shade
Dave Jones, dave@parknplaydesign.com

.2 Site Furnishings at Recreation and Childcare Entries

.1 Bench Type 01:
.1 Product: Vestre Vroom 617-900 Vroom Backed Bench Straight End and 624-900 Armrests (3 Armrests per bench), Refer to Landscape Drawings.
Material: Galvanized and Powder coated steel (Colour TBC)
Linseed oil proofed Nordic pine
Spare Parts: Qty. 20 – Wood Slats (seat)
Qty. 18 – Wood Slats (back)
Qty.4 – Armrests

Mounting: Surface mounted to concrete paving with tamper-proof hardware
Contact: Vestre
Emmanuelle Bourlier
E. emmanuelle@vestre.com
P. (310) 650-6769

.2 Waste Receptacle:
.1 Product: Vestre Bloc Litter Bin 1544L, 37 Gallons with Liner, Refer to Landscape Drawings
(or approved equal)
Material: Galvanized and Powder coated steel (Colour TBC)
Spare Parts: 1 Replacement Liner for each bin
Sizing: 37 Gallons
Mounting: Surface mounted to concrete paving with tamper-proof hardware
Contact: Vestre
Emmanuelle Bourlier
E. emmanuelle@vestre.com
P. (310) 650-6769

.3 Bicycle Rack (Quantities as shown on Drawings):
.1 Location: West and North side of site, near Recreation Centre Entry
Product: Dero Heavy Duty Hoop Rack (or approved equal)
Material: Galvanized & Powder coated (Colour TBC)
Sizing: 2 Capacity
Mounting: Surface mounted to concrete paving with tamper-proof hardware
Contact: jodi@mcleansales.ca

.4 Bicycle Repair Station:
.1 Location: Near Recreation Centre Entry
Product: Greenspoke Freestanding Bike Repair Station with Integrated Pump (or approved equal)
Material: Powder coated – Green (Colour TBC)
Sizing: 1 Bike Capacity
Mounting: Surface mounted to concrete paving with tamper-proof security bolts
Contact: info@greenspoke.com

.3 Parking Lot

.1 Parking Barrier Curb:
.1 Product: Barkman Parking Curb, Item 105179 (or approved equal)
Refer to Landscape Drawings.
Sizing: 2438mm x 203mm x 140mm
Mounting: Surface mounted to asphalt with 2 pins (15mm x 432mm)
Contact: Barkman
August Wiens
E. AWiens@BarkmanConcrete.com
P. (204) 667-3310

PART 3 – EXECUTION

3.1 Installation

.1 Assemble all products in accordance with manufacturer's instructions and as indicated on Drawings.

.2 Install all products true, plumb, and firmly anchored.

.3 Damaged products will be rejected.

.4 Field-verify location and alignment of all furnishings and obtain approval from the Contract Administratorand/or contract administrator prior to mounting.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 All Division 1 Specification Sections.
.2 Section 31 22 13 – Rough Grading
.3 Section 32 93 00 – Planting of Trees, Shrubs, and Ground Covers
.4 City of Winnipeg Tree Planting and Maintenance Specification
.5 City of Winnipeg Standard Specification CW3540 and CW3170

1.2 References

.1 AASHTO T180-09 - Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 inch) Drop.

.2 ASTM D698-07e1 - Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/cu ft (600 kN-m/cu m)).

.3 ASTM D1557-09 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu ft (2,700 kN-m/cu m)).

.4 ASTM D2167-08 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

.5 ASTM D2487-06e1 - Classification of Soils for Engineering Purposes (Unified Soil Classification System).

1.3 Definition

.1 **Compost**: A mixture of soil and decomposing organic matter used as a fertilizer, mulch, or soil conditioner. Compost is processed organic matter containing 40% or more organic matter as determined by the Walkley-Black or LOI test. Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below 25), and contain no toxic or growth inhibiting contaminates. Composed bio-solids must meet the requirements of the Guidelines for Compost Quality, Category ‘A’ produced by the Canadian Council of the Ministers of the Environment (CCME), January 1996.

1.4 Submittals for Review

.1 Section 01 33 00 – Submission Procedures

.2 Samples: Submit, in air-tight containers one (1) 5lb sample of each type of fill to testing laboratory and submit results to Contract Administrator for approval.

1.5 Submittals for Information

.1 Section 01 33 00 – Submission Procedures

.2 Material Source: Submit name of imported materials source.

PART 2 – PRODUCTS

2.1 Source

.1 Use topsoil from stockpiled work carried out under Section 31 22 13 – Rough Grading.

.2 Use imported topsoil. Advise the Contract Administrator of topsoil source to be utilized with sufficient lead time for testing.

.3 Use topsoil from the sources provided by Contract Administrator or approved equal.

2.2 Topsoil

.1 Mixture of particulates, microorganisms and organic matter that provides suitable medium for supporting intended plant growth.
- .1 Topsoil to be a fertile, friable, natural loam containing not less than 4% organic matter for clay loams and not less than 2% organic matter for sandy loams to a maximum of 15% and capable of sustaining vigorous plant growth, free of subsoil contamination, roots, weeds and stones over 25mm diameter; and having a pH ranging from 6.0 to 7.5.
- .2 Contain no toxic elements or growth inhibiting materials.
- .3 Topsoil Consistency: friable when moist.
- .4 Screen topsoil through a 25mm size screen and ensure that it is free from:
  - .1 Debris and stones over 25 mm diameter.
  - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

.2 Topsoil from stockpile is to be screened and amended at the stockpile location before delivery and/or spreading.

2.3 Planting Soil Medium

.1 Refer to Section 32 92 00.

2.4 Fertilizer

.1 Chemical fertilizer with an N-P-K analysis of 1-2-1 ratio at a rate to provide 48 kg actual Nitrogen,96 kg actual Phosphate and 48 kg actual Potassium per hectare.

.2 Fertilizer shall be standard commercial brands meeting the requirements of the Canada Fertilizer Act and the Canadian Fertilizer Quality Assurance Program.

.3 All fertilizers shall be granular, pelletized or pill form, and shall be dry and free flowing.

2.5 Soil Amendments

.1 Peatmoss:

.4 Derived from partially decomposed species of Sphagnum Mosses.
.5 Elastic and homogeneous, brown in colour.
.6 Free of wood and deleterious material which could prohibit growth.
.7 Shredded particle minimum size: 5 mm.

.2 Sand: washed coarse silica sand, medium to course textured.

.3 Organic matter: compost Category A, unprocessed organic matter such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

.4 Limestone:
.1 Ground agricultural limestone.
.2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

.5 Bonemeal: Finely ground with a minimum analysis of 3% nitrogen and 20% phosphoric acid.

2.6 Quality Control

.1 Testing and Analysis of Soil Material: Perform to ASTM D698

.2 The Contractor, at their expense, shall test the topsoil for Nitrogen, Phosphate, Potassium, Potash and minor element values, gradations, clay, silt, soluble salt contents, organic matter, atrazine and pH value in order to determine the amount and type of fertilizer or additives to be applied for specific areas.

.3 Obtain approval of testing agency from the Contract Administrator prior to analysis. Soil sampling, testing and analysis to be in accordance with Provincial standards.

.4 Conduct topsoil tests on imported or existing topsoil that is stripped, stockpiled and reapplied.

.5 Test samples shall be an amalgamation of at least three samples randomly taken from the source. Samples shall be carefully mixed, recorded, labelled and otherwise documented prior to delivery to the testing laboratory

.6 Submit topsoil and planting soil test reports to the Contract Administrator for approval.

.7 If tests indicate materials do not meet specified requirements, change material and retest.

.8 Amend topsoil as necessary to achieve desired standards per the topsoil test report.

.9 Re-testing of amended soil shall be required to demonstrate conformance with the specifications and recommendation of soil tests.

.10 Obtain approval of soil amendments and screening from the Contract Administrator prior to placement.

.11 Provide materials of each type from same source throughout the Work

PART 3 – EXECUTION

3.1 Site Safety and Traffic Control

.1 Where work is to be done in boulevard and median areas adjacent to roadways, the Contractor shall maintain traffic and ensure that protection is afforded to the road user and that the Contractor's operations in no way interfere with the safe operation of traffic.

.2 The Contractor shall supply, erect and maintain all applicable traffic control devices in accordance with the provisions of the latest edition of the Manual of Temporary Traffic Control in Work Areas on City Streets issued by the Public Works Department of the City of Winnipeg.

3.2 Preparation of Existing Grade

.1 Refer to Section 31 22 13 – Rough Grading.

.2 Allow for minor adjustment to rough grade, eliminating uneven areas and low spots to ensure positive drainage.

.3 Remove debris, roots, branches, stones in excess of 25 mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum products if it was contaminated from the time of rough grading acceptance. Remove debris, which protrudes more than 75mm above surface. Dispose of removed material off site.

.3 Cultivate entire area which is to receive topsoil to minimum depth of 150mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

.4 Place filter fabric over catch basins and manholes to prevent clogging with sediment during the spreading of topsoil and fine grading operations.

3.3 Placing of Topsoil

.1 The Contractor shall not commence placement of topsoil until the sub-grade has been inspected and approved by the Contract Administrator.

.2 The Contractor shall provide the Contract Administrator with a minimum of two working days notice for inspection of required grading.

.3 The topsoil mix shall be applied to a minimum of 75 mm compacted depth for areas requiring sod and a 100 mm compacted depth for seeding areas. All areas shall be rolled with a mechanical roller of a minimum weight of 220kg and minimum width of 760mm.

.4 Topsoil shall be manually spread around trees, shrubs and other obstacles.

.5 The Contractor shall ensure that topsoil does not come in contact with new asphaltic concrete pavement that is less than 2 weeks old.

3.4 Finish Grading

.1 Place topsoil only after the Contract Administrator has accepted subgrade.

.2 The area shall be fine graded and the topsoil loosened. Eliminate rough spots and low areas to ensure positive drainage. Prepare a loose friable bed by means of cultivation and subsequent raking.

.3 Topsoil shall be rolled with a mechanical roller of a minimum weight of 220kg, minimum width of 760mm roller, to consolidate it in areas to be seeded or sodded, leaving the surface smooth, uniform, firm against deep foot printing and to the satisfaction of the Contract Administrator.

.4 Place required depth of topsoil for planting beds as indicated on details.

.5 Place 100mm settled depth of topsoil for seeded and sodded areas.

.6 For sodded areas, keep topsoil 15mm below finished grade.

.7 Manually spread topsoil around trees, shrubs and obstacles.

3.5 Acceptance

.1 Obtain approval of finish grading from the Contract Administrator.

3.6 Soil Amendments

.1 For speciality areas noted on plan or designated in the topsoil test results/report, apply and thoroughly mix soil amendments into the full-specified depth of topsoil at recommended rates.

3.7 Soil Removal

.1 Remove lumped soil, boulders, and rock.

.2 Stockpile surplus material in area designated on site and remove excess material not being used, from site.

3.8 Stockpiling

.1 Stockpile materials on site at locations approved by Contract Administrator.

.2 Stockpile in sufficient quantities to meet Project schedule and requirements.

.3 Separate differing materials with dividers or stockpile apart to prevent mixing.

.4 Prevent intermixing of soil types or contamination.

.5 Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.9 Stockpile Cleanup

.1 Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

.2 If a borrow area is indicated, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

3.10 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with General Requirements.

.2 Do not dispose of unused soil amendments into sewer systems, lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 Section 32 91 21 – Topsoil Placement and Grading
.2 City of Winnipeg Standard Specification CW3110 Sub-Grade, Sub-Base and Base Course Construction
.3 City of Winnipeg Standard Specification CW3510 Sodding
.4 City of Winnipeg Standard Specification CW3540 Topsoil and Finish Grading for Establishment of Turf Areas
.5 City of Winnipeg Standard SD-243 Sodding Details

PART 2 – PRODUCTS

2.1 Materials

.1 General:
  .1 The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification. All sod supplied under this Specification shall be subject to inspection and testing by the Contract Administrator and/or the City's Parks Area Superintendent. There shall be no charge to the City for any materials taken by the Contract Administrator or the City's Parks Area Superintendent for inspection purposes.

  .2 Sod will be subject to tests for nitrate, phosphate, potassium, sulphate, pH, E.C. (salinity), mineral soil layer thickness and its organic matter content by a testing laboratory designated by the Contract Administrator.

  .3 Tests conducted to determine the thickness of the mineral soil layer of the sod and it's percent of organic matter shall be done in accordance with standard operating procedures approved by the Contract Administrator for both receiving and analyzing sod samples.

  .4 Any sod placed on the Work Site that in the opinion of the Contract Administrator does not conform to the Specification detailed herein, shall be rejected by the Contract Administrator and replaced by and at the expense of the Contractor.

.2 Topsoil:
  .1 Topsoil shall be supplied in accordance with Clause 5.2 of CW 3540 and Section 32 91 21.

.3 Turf Grass Sod:
  .1 The Contractor shall supply turf grass sod with a mineral soil layer containing a minimum of seventy (70%) percent inorganic soil. Upon delivery or thirty (30) days following delivery, the salinity rating shall be less than 4.0 mm hos/cm on a saturated paste basis. The pH range shall

be between 6.0 – 8.0. Sod supplied shall have been sown in nursery fields with Canada Certified No. 1 or Canada Certified No. 2 grass seed and mixed by percentage (%) of weight to meet the following certified seed blends or mixtures:

.1 Athletic grounds, sod shall contain a blend composed of:
  .1 One hundred (100%) percent Kentucky Bluegrass (100% Class 1 cultivars as specified in Clause 2.1.3.3, 3 cultivars in equal proportion).

.2 For general park areas, boulevards, medians and interchange areas, sod shall contain:
  .1 A blend composed of one hundred (100%) percent Kentucky Bluegrass (100% Class 1or Class 2 cultivars as specified in Clause 2.1.3.3, 3 cultivars in equal proportion); or

  .2 A mixture of ninety-five (95%) percent Kentucky Bluegrass (100% Class 2 cultivars as specified in Clause 2.1.3.3, 3 cultivars in equal proportion) and five (5%) percent Creeping Red fescue.

.3 Wherever Kentucky Bluegrass is specified, the proportion of the cultivars to be included in the blend shall adhere to the following:

Class 1 Cultivars – specified blend of Class 1 cultivars shall consist of equal proportions of any three of the following:

Able 1	Absolute	Allure	Award	Baron
Bartitia	Blacksburg	Blackstone	Caliber	Challenger
Chateau	Estate	Explorer	Kelly	Liberator
Limousine	Midnight	Misty	Northstar	NuGlade
Pick 151	Pick 8	Platini	Quantum Leap	Rambo
Rugby II	Serene	Shamrock	SR 2000	Total Eclipse
Touchdown	Unique	VB 16015	Wildwood	

Class 2 Cultivars – specified blend of Class 2 cultivars shall consist of equal proportions of any three of the following:

A34	Abbey	Alpine	America	Apollo
Arcadia	Ascot	ASP 200	Banff	Baronie
Baruzo	Bluechip	Cardiff	Champagne	Chicago
Classic	Compact	Conni	Coventry	Crest
Cynthia	Dragon	Eclipse	Fortuna	Glade
Goldrush	Haga	Huntsville	Impact	Indigo
Jefferson	Kenblue	Langara	Lipoa	Livingston
Marquis	Mercury	Moonlight	Nimbus	NuBlue
NuStar	Odyssey	Park	Pepaya	Pick 3
Pick 4	Pick 855	Princeton 105	Raven	Rugby
Seabring	Sodnet	SR 2100	SR 2109	Washington

.4 Any variations to the above referenced seed blends or mixtures shall be approved by the Contract Administrator prior to placement of sod.

.5 Turf grass sod shall be free of disease, turf damaging insects and any grass specifies, strains or cultivars other than specified herein.

.6 At the time of delivery, the turf grass sod shall:

.1 Not contain more than ten (10) broadleaf weeds per fifty (50) square meters;

.2 Have been mowed to a height of 50 mm prior to delivery and be of sufficient density that no surface soil will be visible;

.3 Have a uniform inorganic soil layer thickness of not less than 12 mm and not greater than 19 mm and shall be consistent throughout all loads delivered to the work site;

.4 Have the organic thatch layer within the sod not exceed an uncompressed thickness of 12 mm and in all cases, the final rolled and compacted topsoil/sod growing medium shall be maintained at not less than 100 mm in depth.

.4 Sod establishment support:

.1 Wooden pegs: 17 x 8 x 200 mm, only if required as per slopes noted on SD-243.

.5 Water:

.1 Potable, free of impurities.

.6 Fertilizer:

.1 To Canada "Fertilizers Act" and "Fertilizers Regulations".

.2 Complete, synthetic, slow release with 65 % of nitrogen content in water-insoluble form.

2.2 Source Quality Control

.1 Obtain approval from Contract Administrator of sod source.

.2 When proposed source of sod is approved, use no other source without written authorization.

PART 3 – EXECUTION

3.1 Site Safety and Traffic Control

.1 Where work is to be done in boulevard and median areas adjacent to roadways, the Contractor shall maintain traffic and ensure that protection is afforded to the road user and that the Contractor’s operations in no way interfere with the safe operation of traffic.

.2 The Contractor shall supply, erect, and maintain all applicable traffic control devices in accordance with the provisions of the latest edition of the Manual of Temporary Traffic Control in Work Areas on City Streets issued by the Public Works Department of the City of Winnipeg.

3.2 Preparation

.1 Site grading will be done and paid for in accordance with Specification CW 3110.

.2 Verify that grades are correct and prepared in accordance with Specification CW 3110. If discrepancies occur, notify the Contract Administrator and do not commence work until instructed by the Contract Administrator.

.3 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.

.4 Remove and dispose of weeds; debris; stones 25 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials off site.

.5 Fine grade surface free of humps and hollows to smooth, even grade, elevations indicated, and to a tolerance of plus or minus 8 mm. Surface to drain naturally.

3.3 General

.1 The Contractor shall not commence sodding operations until the finished topsoil surface has been inspected and approved by the Contract Administrator.

.2 The Contractor shall provide the Contract Administrator with a minimum of two working days notice for inspection of the finished topsoil surface.

3.4 Topsoil and Finished Grading

.1 Preparation of the finished topsoil surface shall be completed in accordance with Specification CW 3540.

.2 To prevent the formation of depressions or water pockets, the Contractor shall smooth out any undulations or irregularities in the topsoil prior to placing the sod.

3.5 Sod Placement

.1 The sod shall be placed evenly and closely packed together, leaving no open joints and no overlap on adjacent pieces of sod. Joints in adjacent rows shall be staggered, as shown in Standard Detail SD-243. A full row of sod, not less than 450 mm in width shall be placed along the perimeter of the sodded area, parallel to planting or walkway areas.

.2 Where big roll sod is to be placed, the Contractor shall ensure that any reinforcement used to assist with the harvesting and/or placement of the sod roll is removed before final placement of the sod.

.3 On embankments, sod shall be placed lengthwise across the face of the slope. On slopes of 1 vertical to 3 horizontal (18 degrees) or steeper, in every second row on the slope and at the foot of the slope, each piece of sod shall be pegged with two minimum 250 mm long wooden pegs driven into the soil layer of the sod.

.4 For slopes of 1 vertical to 2 horizontal (26 degrees) or steeper, each piece of sod in every row shall be pegged as indicated above.

.5 When abutting an existing turfed area, cut the existing turf to form a straight joint with the new sodded area.

.6 Small, broken or irregular pieces of sod will be rejected.

.7 All visible joints, low, bare or dead spots shall be repaired to the satisfaction of the Contract Administrator prior to the commencement of the Ninety (90) Day Maintenance Period described in Clause 3.8.

.8 Sodding operations shall be completed within two working days after placing the sod. This shall be deemed to include watering, rolling, and repairing any visible joints and low, bare or dead spots within the sodded area.

.9 Sod shall not be placed in a frozen state, or when any other conditions unfavourable to the successful transplanting of sod exist.

.10 The Contractor shall not place sod after September 15 unless the Contract Administrator gives written approval to proceed.

.11 Should the Contract Administrator provide written approval to, or direct the Contractor to place sod after September 15, and termination of the sod maintenance period is not achieved in accordance with Clause 3.11 in that same year, the Contractor will not be held responsible for sod damage over the winter due to winter-kill, ice damage, sand/salt applications on adjacent streets or from snow removal or spring clean up equipment. When the Contract Administrator provides written approval, or direction to the Contractor to place the sod after September 15, the City will assume all costs related to the spring replacement of sod damaged over the winter provided that the layover was due only to the later season start and not defective sod or maintenance not conforming to the Specification.

.12 Where the Contractor places sod prior to September 15, and termination of the sod maintenance period is not achieved in accordance with Clause 3.11 in that same year, the Contractor shall be responsible for replacement of any sod damaged over the winter due to winter-kill, ice damage, sand/salt applications or adjacent streets, or from snow removal or spring clean up equipment.

3.6 Watering and Rolling

.1 Immediately after placement of sod, the Contractor shall water the area in sufficient quantities and frequencies required to obtain root development and sod growth. All costs to provide water for sodded areas shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.

.2 After the sod and topsoil has dried sufficiently to prevent damage, the areas shall be rolled (the edges pounded if necessary) with a mechanical roller minimum weight of 220kg and minimum width of 760mm to form a uniform even surface and level with adjoining existing grades, sidewalks and curbs. Heavy rolling to correct irregularities in grade will not be permitted. Sodded areas near existing fixtures that are unable to be rolled shall be thoroughly tamped to ensure a good bond between topsoil and sod.

3.7 Fertilizing Program

.1 Amend topsoil for sodded area using soil test analysis results as specified in Specification CW 3540.

.2 Chemical fertilizer with an N-P-K analysis (ratio shown below) at a rate to provide for N(Nitrogen) 48 kg/hectare. Fertilizer shall be standard commercial brands meeting the requirements of the Canada Fertilizer Act and the Canadian Fertilizer Quality Assurance Program. Fertilizer shall be standard commercial brands meeting the requirements of the Canada Fertilizer Act and the Canadian Fertilizer Quality Assurance Program. All fertilizer shall be Poly Coated Sulphur Coated Urea (PCSCU) or Poly Coated Urea (PCU) fertilizer.

Spring application (Mid-May) /Starter application (Prior to Sod being laid as per CW3540, CW3510)	1.5 – 2 - 1
Mid-Season Application (Mid-July)	4 – 1 - 2
Fall Application (Mid-September)	1 – 0 - 2

3.8 Commencement of Ninety (90) Day Maintenance Period

.1 Immediately after the sod has been placed to the satisfaction of the Contract Administrator, the Contractor shall provide and pay for continuous maintenance of the sodded area until the criteria specified for termination of the maintenance period in Clause 3.11 has been met.

.2 The Contract Administrator will not allow the Ninety (90) Day Maintenance Period to commence until the following requirements are met:

.1 Written approval has been granted by the Contract Administrator to place sod if after September 15.
.2 The nursery sod supplied meets the seed mixture requirement specified in Clause 2.1.3.
.3 The sod is free of bare and dead spots.

.4 The nursery sod does not contain more than 10 broadleaf weeds per 50 square meters.
.5 Sodded area has been rolled to form a firm, uniform even surface.
.6 The sod has sufficient shoot density that no surface soil is visible within sod.
.7 The height of the top growth of the sod is between 50 – 60 mm.
.8 The sodded area is free of any visual obstructions such as leaves
.9 Sodded area is free of any turf damaging insects.

.3 Any deficient, damaged or vandalized areas shall be resodded by the Contractor within three working days after receiving notification from the Contract Administrator and the area so resodded, shall be further maintained until it meets the criteria specified in Clause 3.11.

.4 In In situations where the start of the Ninety (90) Day Maintenance Period is not granted by the Contract Administrator before the end of a growing season, the Ninety (90) Day Maintenance Period will commence on May 15 of the following year or such date as is mutually agreed upon by all parties, at which time all sodded areas must meet the requirements listed above.

3.9 Maintenance of Sodded Areas

.1 The Contractor shall mow the turf area at regular intervals to a height of between 50 - 60 mm. Do not cut more than thirty (30%) percent of the grass height at any one mowing. Remove clippings that will smother grassed areas.

.2 The Contractor shall water sodded areas in sufficient quantities and frequencies required to maintain sod growth. All costs to provide water for sodded areas shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.

.3 The Contractor shall provide adequate protection of sodded areas from erosion, pedestrian and mechanical damage, and shall only remove such protection after the sodded area has been accepted by the City's Parks Area Superintendent or designate.

.4 The Contractor shall clean and remove all dead vegetation, leaves, debris and snow mold from turf areas to encourage healthy and uniform grass growth.

.5 Given the need for weed control, the Contractor shall have in his possession a Pesticide Applicator's License and a Pesticide Use Permit for pesticide applications related to this Specification.

.6 The Contractor shall apply herbicide when broadleaf weeds start developing in competition with grass. Apply herbicide in accordance with the City of Winnipeg Weed Control Standards and Procedures, manufacturer's instructions and the Manitoba Agriculture Guide to Crop Protection and Herbicide Recommendations for Landscape Applicators, latest editions and the following criteria:

.1 Use 2,4-D Amine or MCPA Amine herbicide for susceptible broadleaf weeds.
.2 Use a mixture containing 2,4-D Amine or MCPA Amine, Mecoprop and Dicamba for 2,4-D resistant plants.
.3 Do not apply to newly seeded turf until after the second or third mowing.
.4 Do not water within 24 hours after application.
.5 Apply when winds are less than 20 km/h and air temperature is above 10° (degrees) Celsius.
.6 Avoid use of pure Dicamba solutions near trees and shrubs.

.7 Given the need for insect control, the Contractor shall have in his possession a Pesticide Applicator's License and a Pesticide Use Permit for pesticide applications related to this Specification. Use standard commercial products in accordance with the manufacturer's instructions and the Manitoba Agriculture Guide to Crop Protection (latest edition) for the particular insect/insects involved.

.8 Copies of the Pesticide Applicator's License and the Pesticide Use Permit must be submitted to the Contract Administrator prior to commencement of pesticide application.

.9 All persons handling pesticides shall be fully aware of toxicological rules and regulations governing their use.

.10 The Contractor shall inform the Contract Administrator immediately of any dangerous occurrence.

3.10 Spring Clean Up

.1 Where termination of the sod maintenance period has not been achieved in accordance with Clause 3.11 prior to the end of a growing season, the Contractor shall complete all operations related to the clean up of the work area in the following spring. This shall include the cleaning and removal of all dead vegetation, leaves, debris, snow mold and any sand or gravel resulting from winter sanding/deicing operations from turf areas to encourage healthy and uniform grass growth.

.2 All costs for spring clean up operations shall be borne by the Contractor if in the previous year, the termination of the sod maintenance period, in accordance with Clause 3.11 was not achieved in that same year or where the damage was due to defective sod or maintenance not conforming to this Specification.

3.11 Termination of Maintenance Period

.1 The Contract Administrator will terminate the sod maintenance period after the following criteria has been met:
.1 The work site is clean and the sodded area is free of any visual obstructions such as leaves
.2 The sod is free of bare and dead spots and without more than 10 broadleaf weeds per 50 square meters. Do not apply to newly seeded turf until after the second or third mowing.

.3 Grass roots are well anchored into the underlying topsoil and the sodded area has established into a healthy, vigorously growing condition.
.4 Sodded areas are free of visible joints.
.5 The sod has sufficient shoot density that no surface soil is visible when the grass has been cut to a height of 50 – 60 mm.
.6 Sodded area has been cut to a height of 50 – 60 mm within two working days before the final inspection.
.7 Sodded area is free of any turf damaging insects.

.2 If the sodded area does not meet the above criteria, the deficient area shall be resodded within three working days after receiving notifications from the Contract Administrator and maintained by and at the expense of the Contractor in accordance with Clauses 3.8 and 3.9 herein.

.3 In situations where the termination of the maintenance period is not granted by the Contract Administrator before the end of a growing season, the maintenance period will commence as described in Clause 3.8.

3.12 Site Clean Up

.1 During both the placement and maintenance of sod, all sidewalks, streets, approaches, driveways and properties near the sodding operation shall be kept clean at all times by the Contractor.

.2 Upon completion of the project, the Contractor shall immediately remove all excess material, debris and equipment from the work site.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 All Division 1 Specification Sections.
.2 Section 31 23 13 – Rough Grading
.3 Section 31 32 21 – Geotextiles
.4 Section 32 91 21 – Topsoil Placement and Grading
.5 Section 32 94 51 – Soil Cells
.6 City of Winnipeg Standard Specification CW1120
.7 City of Winnipeg Standard Specification CW3540
.8 City of Winnipeg Tree Planting and Maintenance Specification

1.2 References

.1 Canadian Nursery Landscape Association (CNLA) – Canadian Standards for Nursery Stock - Latest Edition.
.2 Agriculture and Agri-Food Canada (AAFC), Plant Hardiness Zones in Canada-[2000].
.3 City of Winnipeg Principles and Guidelines for Tree Planting Options.
.4 City of Winnipeg Boulevard Tree Planting Guidelines, and it's associated references, which includes but is not limited to Acceptable Tree Species for Boulevard Planting. All relevant documents are available on the City of Winnipeg Urban Forestry Branch website.
.5 City of Winnipeg Standard Detail SCD-501 Preparation of Planting Area
.6 City of Winnipeg Standard Detail SCD-515 Coniferous Tree Planting Parks
.7 City of Winnipeg Standard Detail SCD-516 Deciduous Tree Planting Tree Well
.8 City of Winnipeg Standard Detail SCD-517 Standard Detail for Tree Planting
.9 City of Winnipeg Standard Detail SCD-518 Special Detail for Tree Planting with Tree Spade Excavated Pit
.10 City of Winnipeg Standard Detail SCD-519 Special Detail for Tree Planting in Restricted Areas

1.3 Product Data

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Provide product data for:
  .1 Fertilizer.
  .2 Anti-desiccant.
  .3 Mulch.
  .4 Guying assembly including clamps, collar, guying wire, anchors and wire tightener.

1.4 Administrative Requirements

.1 Scheduling: obtain approval from Contract Administrator of schedule 7 days in advance of shipment of plant material.
.2 Schedule to include:
  .1 Quantity and type of plant material.

.2 Shipping dates.
.3 Arrival dates on site.
.4 Planting Dates

1.5 Submittals

.1 Scheduling: Obtain approval from Contract Administrator of planting schedule 7 days in advance of shipment of plant material. Scheduling of planting installation to precede any site elements within or adjacent to planting beds that require excavation. Schedule to include:
.1 Date for selection of plant material at source by Contract Administrator.
.2 Quantity and type of materials
.3 Shipping dates.
.4 Arrival dates on site.
.5 Date of planting

1.6 Source Quality Control

.1 Obtain approval from the Contract Administrator of plant material at source prior to digging.

1.7 Quality Assurance

.1 Qualifications:
.1 Landscape Contractor: to be a Member in Good Standing of Manitoba Horticultural Trades Association.
.2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.
.3 Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Ornamental Maintenance designation.
.2 Trees and shrubs are to be planted in accordance with CLNA recommendations, ANSI A-300 Planting Standards.

1.5 Storage and Protection

.1 Protect plant material from frost, excessive heat, wind and sun during delivery.

.2 Immediately store and protect plant material which will not be installed within 1 hour after arrival in an approved site storage location.

.3 Protect plant material from damage during transportation:
.1 When delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.
.2 When delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.
.3 Protect foliage and root balls using anti-desiccants and tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.

.4 Protect stored plant material from frost, wind and sun and as follows:

.1 For bare root plant material, preserve moisture around roots by heeling-in or burying roots in sand or topsoil and watering to full depth of root zone.
.2 For pots and containers, maintain moisture level in containers. Heel-in fibre pots.
.3 For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

1.6 Public Safety and Traffic Control

.1 In accordance with the Manual of Temporary Traffic Control, the Contractor ("Agency" in the manual) shall make arrangements with the Traffic Services Section of the City of Winnipeg to place all temporary regulatory signs. The Contractor shall bear all costs associated with the placement of temporary traffic control devices by the Traffic Services Section of the City of Winnipeg in connection with the works undertaken by the Contractor. The requirements shall include the following:
  .1 The Contractor shall barricade the sidewalk surrounding the Work;
  .2 The Contractor shall maintain traffic flow and ensure that protection is afforded to the road user and that the Contractor's operations shall in no way interfere with the safe operation of traffic.

PART 2 – PRODUCTS

2.1 Tree Grates and Guards

.1 Refer to Section 32 33 00 Site Furnishings

2.2 Planting Soil Medium

.1 The planting soil shall be topsoil that complies with CW 3540, Section 5.2.
  .1 Further to CW 3540 section 5.2, planting soil shall contain maximum ten percent (10%) organic matter (peat, rotted manure or composted material).

.2 At the discretion of the Contractor Administrator, planting soil may be subject to tests for nitrate, phosphate, potassium, sulphate, pH, E.C. (salinity), and volume of organic matter, by a testing laboratory designated by the Contract Administrator.

.3 The Contract Administrator reserves the right to reject planting soil not conforming to the requirements of these Specifications.

2.3 Plant Material

.1 Plant material to conform to the applicable details and as listed in the "Plant Schedule" on drawings.

.2 Substitutions for specified plants require the Contract Administrator's written approval prior to delivery.

.3 Type of root preparation, sizing, grading and quality: comply to Canadian Nursery Stock Standards, latest edition.
- .1 Source of plant material: grown in Zone 2 (a or b) or 3 (a or b) will be accepted. Nursery stock that has grown in plant hardiness zones 1 and 4 or greater will be rejected.
- .2 Plant material must be planted in zone specified as appropriate for its species.
- .3 Plant material in location appropriate for its species.

.4 Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.

.5 Trees: with straight trunks, well and characteristically branched for species.

.6 Bare root stock: nursery grown, in dormant stage, not balled and burlapped or container grown.

.7 Collected stock by trained individuals: maximum 40 mm in caliper, with well-developed crowns and characteristically branched; no more than 40% of overall height may be free of branches. During collection, ensure 10% maximum seed crop (or plants) are collected from healthy population of many individuals, and from several plants of same species. Leave remainder for natural dispersal and as food for dependent organisms.

.8 Do not deliver more plants to the site than there is space with adequate storage conditions. Provide a suitable remote staging area for plants and other supplies.

.9 Provide protective covering over all plants during transportation to prevent wind burn.

2.4 Water

.1 Potable water, free of impurities that would inhibit plant growth.

.2 The Contractor shall provide water, so that:
- .1 All costs to provide water for the watering operation and all associated costs shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.
- .2 Further to clause 3.7 of CW 1120-R1, the Contractor shall pay for all costs associated with obtaining water in accordance with the Waterworks By-law. Sewer charges will not be assessed for water obtained from a hydrant.

.3 Water shall be free of oils, acids, alkalis, salts and other substances that may be detrimental to plant growth. Water suitable for human consumption shall be acceptable without testing.

.4 Water from rivers and streams shall not be used without prior approval of the Contract Administrator.

.5 Should the Contract Administrator determine that water quality testing is necessary, an approved testing laboratory shall perform the test at the sole expense of the Contractor.

2.5 Trunk Protection and Tree Support

.1 Upon completion of the planting operation, the Contractor shall install trunk protection by slicing open a 100 mm diameter x 600 mm long section of plastic weeping tile material and placing it around the base of each tree trunk.

.2 Tree support stakes shall be T-rail iron stakes 40 x 40 x 5 x 1540 mm long, primed with 1 brush coat of zinc rich plant paint to CGSB 1-GP-191B. Stakes shall be uniform in style and colour.

.3 Other products may be used with prior permission in writing from the Contract Administrator.

.4 The guying straps shall be attached in accordance with the drawings referenced in Clause 1.2 and shall be of a material that is non-abrasive to the tree to prevent girdling injury:
a) Hose-covered wire, flexible belting or any strong, soft wide strips of material is acceptable.

.5 Where wire is used, ensure ends are twisted tight. Protruding ends are unacceptable.

2.6 Mulch

.1 The Contractor shall provide mulch. Mulch shall:
.1 Be a clean bark or wood chip with minimal amount of leaves, branches and other extraneous matter; and
.2 Not contain adhesives, wood preservatives or any other chemical contaminants, and
.3 Consist of chips not less than 15 mm nor larger than 75 mm in size and not more than 20 mm thick.

2.7 Fertilizer

.1 Synthetic commercial type as recommended by manufacturer.

2.8 Anti-Dessicant

.1 Wax-like emulsion.

PART 3 – EXECUTION

3.1 Pre-Planting Operations

.1 Ensure plant material on site is acceptable to Contract Administrator.

.2 Deliver all materials in their original containers with all labels intact and legible. Containers with additives shall clearly indicate contents, weight, analysis and manufacturer's name.

.3 Prune damaged roots and branches from plant material.

.4 Apply anti-desiccant to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.

.5 Contractor to stake out location of tree pits and shrub beds, including tree locations throughout site, to obtain approval from the Contract Administrator prior to excavating.

.6 Tree layout to be reviewed by the Contract Administrator and City to ensure all locations align with future phases of work on or adjacent to the site. Tree locations to be adjusted on site, as needed.

3.2 Tree Pits

.1 Tree pits shall be excavated using the following methods:
- .1 The preferred method of excavation is by backhoe or hand shovel (see SCD 517),
- .2 Tree pits shall be minimum 2 times the diameter of the minimum accepted root ball diameter noted in Acceptable Tree Species of Boulevard Planting.
- .3 Pit depth shall be such that the top of the root ball is even with the final grade.
- .4 Further to Clause 3.2.1, if the Contractor chooses to use a tree spade to excavate tree pits, Clause 3.2.2 shall apply.
- .5 If the planting site is in a restricted space, Clause 3.2.3 shall apply.

.2 Tree pits excavated using a tree spade shall employ the following methods (see SCD 518):
- .1 Tree pits excavated with tree spades shall be a minimum of 2 times to diameter of the minimum accepted root ball diameter noted in Acceptable Tree Species of Boulevard Planting.
- .2 Pit depth shall be the same as stated in Clause 3.2.1.3.
- .3 One cubic foot of soil around the edge of the tree pit shall be turned and sufficiently loosened with a shovel to scarify pit.

.3 Tree Pits in Restricted Sites shall be excavated using the following methods (see SCD 519):

.1 Tree pit diameter on the axis parallel to the street or other hard surface shall be a minimum of 1.5 times the diameter of the minimum accepted root ball as noted Acceptable Tree Species of Boulevard Planting.

.1 Pit diameter on the axis perpendicular to the street or other hard surface shall be 300 mm (12”) greater than the minimum accepted root ball diameter as noted in Acceptable Tree Species of Boulevard Planting.

.2 Pit depth shall be the same as stated in Clause 3.2.1.3.

.1 Tree pits are not to be dug within 1.5 m of an existing private approach.

.2 Tree pits are not to be dug within 1 m of existing underground utilities.

a) The contractor may dig a smaller tree pit to conform to this minimum distance guideline when necessary.

.3 If the planting location contains a stump with a diameter less than 150 mm (5”), the stump shall be removed.

.3 The sides of all tree pits shall be scarified to the depth of one shovel blade.

.4 The bottom of all excavations shall be protected against freezing.

.5 Tree pits shall be left open for a maximum of 24 hours.

.1 Pits that are left open overnight must be covered with a sheet of plywood and be marked with a minimum of one (1) safety cone. Plywood shall be a minimum thickness of 15mm (5/8”)

3.3 Planting Period

.1 The Contractor shall not plant trees during periods of extreme heat, at the discretion of the Contract Administrator.

.1 The City of Winnipeg reserves the right to refuse acceptance of any or all trees failing to meet the above timing restrictions

3.4 Planting

.1 The Contractor is expected to plant trees as follows:

.1 All trees shall be set plumb and shall be placed in the centre of the tree pit;

.2 Trees shall be placed on undisturbed soil and to a depth equal to that at which they were originally growing at the nursery, such that the first order of roots are just below grade.

.3 Once the tree has been set in its final position, burlap on the root ball shall be cut from the top 1/3 of the root ball:

a) If a wire basket has been used, it shall be folded back or cut off from the top of the root ball.

b) All twine shall be removed from the root ball.

.4 After the root ball is prepared, fill tree pit with planting soil as per E8.3, in layers of 150 mm depth and compact the independent layers of soil by tamping.
.5 Tamp soil around root system to eliminate air voids.
.6 Grade the area around the tree according to the drainage type.
.7 All planting areas shall be levelled, raked and edged to give a neat appearance.

.2 For shrubs:
.1 Backfill soil evenly to finish grade and tamp to eliminate air pockets.

.3 Dispose of burlap, wire and container material off site.

.4 Upon completion of the planting operation, the Contractor shall:
.1 Install tree trunk protection (as per Clause 2.5 around the base of each tree trunk).
.2 Install stakes and straps (see Clause 2.5), if deemed necessary.
.3 If, upon inspection by the Contract Administrator or designate, it is determined that a stake is necessary (e.g. excessive wind) the Contractor shall be responsible for installing the stake and strap as requested. Avoid damaging root ball with stake.
.4 Form a water dish from the soil around the outside edge of the root ball with a berm 100 mm in height. Soil shall not be piled around the tree trunk.

.5 Install mulch as per Clause 2.6.

.6 Administer watering:
.1 Watering must be done slowly to ensure that water does not run away from the root zone and so the top 300 mm of the soil around the root system of the tree are well saturated.
.2 Use a low-pressure open flow nozzle and hose.
.3 The water stream must not gouge out a hole in the soil or mulch.

3.5 Installation of Accessories and Trunk Protection

.1 Ensure trunk protection collars (weeping tile) and tree supports (staking) are maintained in good condition, serving their intended function and posing no threat to public safety.

.2 The tree protection collars (weeping tile) shall be left on trees after the maintenance period is completed. The Contract Administrator shall assume responsibility for collar removal.

.3 Tree supports shall be removed or left in place at the end of the warranty period as directed by the Contract Administrator.

3.6 Long Term Maintenance of New Plantings

.1 The Contractor shall be responsible for the maintenance of all plant material for a period of two (2) full growing season, or as specified in the Development

Agreement, from date of acceptance. Plant material shall be accepted to start warranty when installation in accordance with the Drawings and Specifications is complete and there is no sign of wilting, chlorosis, pest infestation, transplant shock or any conditions deleterious to longevity and appearance. Defective plants shall be replaced within thirty (30) days of notification to the Contract Administrator and shall be further maintained for the established maintenance period.

.2 The Contractor shall furnish all labour, materials, equipment and services necessary to perform ongoing care of the plant material, which shall include but not be limited to:
- .1 Mulching, in accordance with Clause 2.6 and 3.6.3.
- .2 Watering, in accordance with Clause 2.4 and 3.6.3.
- .3 Weed Control, in accordance with Clause 3.6.3.

.3 The Contractor shall:
- .1 Program the timing of operations to plant growth, weather conditions and use of the Site.
- .2 Do each operation continuously and complete within a reasonable time period.
- .3 Store equipment and materials off-site.
- .4 Add additional mulch as required to maintain minimum constant depth of mulch. Clean up edges and contain mulch within the designated area.
- .5 Water trees as follows:
  - a) immediately upon immediately upon being planted and every week for the first three (3) weeks after planting;
  - b) thereafter, watering shall be done every 7 – 14 days between May and October or as frequently as necessary (compensating appropriately for weather) to sustain vigorous plant growth;
  - c) by watering slowly to ensure that water does not run away from the root zone and so the top 300 mm of soil around the root system of the tree is well saturated;
  - d) by using a low pressure open flow nozzle and hose. The water stream must not gouge out a hole in the soil or mulch;
  - e) by using the recognized standard for tree watering as approximately 8-10 times during the growing season with the following amounts of water depending on the caliper of the tree – the rule of thumb is 40 litres of water per 25 mm caliper;
  - f) by recognizing watering requirements of trees are dependant upon on a number of variables such as tree species, soil type, when planted, and weather including precipitation. These watering requirements are a minimum standard and shall be followed unless otherwise directed by the Contract Administrator or designate.
  - g) by applying a final watering for all trees, regardless of when planted, that shall be completed after temperatures fall below freezing to ensure adequate moisture in root zone at freeze-up.
- .6 Water all shrubs and ground cover plantings to maintain soil moisture conditions for optimal growth and health of plant material without causing soil erosion.
- .7 Maintain surface of tree pit by hand weeding during the watering process as follows:

a) do not allow weeds to establish for a period longer than two (2) weeks; and
b) do not use any herbicides for weed control near trees unless authorized by the Contract Administrator.

.8 Prune all plants to remove dead and broken branches. Pruning to be completed by a certified Arborist as per the City of Winnipeg pre-approved tree contractors list.

.9 The Contractor must inform the Contract Administrator of watering progress and schedule by 9:00 AM each day of watering.

.10 The Contractor must inform the Contract Administrator immediately of any equipment breakdown or delay in watering and maintenance. Once a watering cycle is completed, submit a log-sheet to the Contract Administrator identifying the following:
a) the location where maintenance Work is carried out; and
b) preventative or corrective measures required which are outside Contractors' responsibility.

.11 Any trees planted to replace trees that have died during the maintenance period will receive full 2 years maintenance from the date that the replacement tree was accepted.

3.7 Acceptance

.1 Refer to Clause 3.6.1.

END OF SECTION

PART 1 – GENERAL

1.1 Summary

.1 Section includes:
- .1 Silva Cell system for planting and paving, including Silva Cell assemblies and related accessories.
- .2 Other materials including, but not limited to, geotextile, geogrid, aggregate, subbase material, backfill, root barrier, and planting soil.

.2 Related requirements:
- .1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- .2 Geogrid to CW3135
- .3 Aggregate CW3110
- .4 Section 31 32 21 – Geotextiles
- .5 Section 32 14 13 – Precast Concrete Unit Paving
- .6 Section 32 16 00 – Curbs, Gutters and Sidewalks
- .7 Section 32 94 56 – Planting Soil for Soil Cells

1.2 References

.1 Definitions:
- .1 AGGREGATE BASE COURSE: Aggregate material between the paving and the top of the Silva Cell deck below, designed to distribute loads across the top of the deck.
- .2 AGGREGATE SETTING BED FOR PAVERS: Aggregate material between the aggregate base course and unit surface pavers, designed to act as a setting bed for the pavers.
- .3 AGGREGATE SUBBASE: Aggregate material between the bottom of the Silva Cell base and the compacted subgrade below, designed to distribute loads from the Silva Cell bases to the subgrade.
- .4 BACKFILL: The earth used to replace or the act of replacing earth in an excavation beside the Silva Cell system to the excavation extents.
- .5 FINISH GRADE: Elevation of finished surface of planting soil or paving.
- .6 PLANTING SOIL: Soil as defined in Division 32, Section 32 94 56 - Planting Soil for Silva Cells, intended to fill the Silva Cell system and other planting spaces.
- .7 SILVA CELL SYSTEM:
  - a. Silva Cell: One assembled unit made up of 1 base, 6 post assemblies, and 1 Silva Cell deck.
  - b. Silva Cell System: Two or more Silva Cells used in combination with each other and with required accessories.
- .8 SUBGRADE: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill.
- .9 WALK-THROUGH: A process for light compaction of soils by walking through the soil following placement.

.2 Reference Standards:

.1 American Association of State Highway and Transportation Officials (AASHTO):
   a. AASHTO H-20
.2 ASTM International (ASTM):
   a. ASTM D448-12, Standard Classification for Sizes of Aggregate for Road and Bridge Construction
   b. ASTM D698-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft^3 [600 kN-m/m^3])
   c. ASTM D1241-07, Standard Specification for Materials for Soil-Aggregate Subbase, Base, and Surface Courses
   d. ASTM D3786/D3786M-13, Standard Test Method for Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method
   e. ASTM D4491-99a(2014)e1, Standard Test Methods for Water Permeability of Geotextiles by Permittivity
   f. ASTM D4533-D4533M-15, Standard Test Method for Trapezoid Tearing Strength of Geotextiles
   g. ASTM D4632-D4632M-15, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
   h. ASTM D4751-12, Standard Test Method for Determining Apparent Opening Size of a Geotextile
   i. ASTM D4833/D4833M-07(2013)e1, Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
   j. ASTM D5262-07(2012), Standard Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics
   k. ASTM D6241-14, Standard Test Method for Static Puncture Strength of Geotextile and Geotextile-Related Products Using a 50mm Probe
   l. ASTM D6637-11, Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method

.3 City of Winnipeg Standard Specification CW3130
.4 City of Winnipeg Principles and Guidelines for Tree Planting Options
.5 City of Winnipeg's Tree Planting Standards for Downtown & Regional Streets

1.3 Administrative Requirements

.1 Pre-installation Conference: Prior to installation of the Silva Cell system and associated Work, meet at Project site with the Contractor, Silva Cell system installer and their field supervisor, manufacturer's technical representative, the Contract Administrator, the City, and other entities concerned with the Silva Cell system performance.
   .1 Provide at least 72 hours advance notice to participants prior to convening pre-installation conference.
   .2 Introduce and provide a roster of individuals in attendance with contact information.

.3 The pre-installation conference agenda will include, but is not limited to the review of:
- a. Required submittals both completed and yet to be completed.
- b. The sequence of installation and the construction schedule.
- c. Coordination with other trades.
- d. Details, materials and methods of installation.
  - a. Review requirements for substrate conditions, special details, if any, installation procedures.
  - b. Installation layout, procedures, means and methods.
- e. Mock-up requirements.

.2 Sequencing and scheduling:
- .1 General: Prior to beginning Work of this Section, prepare a detailed schedule of the Work involved for coordination with other trades.
- .2 Schedule utility installations prior to beginning Work of this Section.
- .3 Where possible, schedule the installation of the Silva Cell system after the area is no longer required for use by other trades and Work. Where necessary to prevent damage, protect installed system if Work must occur over or adjacent to the installed Silva Cell system.

1.4 Submittals

.1 Action Submittals: Submit these to the Contract Administrator for review and acceptance not less than 45 days prior to start of installation of materials and products specified in this Section.
- .1 Product Data: For each type of product, submit manufacturer's product literature with technical data sufficient to demonstrate that the product meets these specifications.
- .2 Test and Evaluation Reports:
  - a. Submit results of compaction testing required by the Specifications for approval.
  - b. Include analysis of bulk materials including soils and aggregates, by a recognized laboratory that demonstrates that the materials meet the Specification requirements.
- .3 Samples:
  - a. One full size sample of an assembled Silva Cell.
  - b. One 6-inch (150-mm) square piece of geogrid.
  - c. One 6-inch (150-mm) square piece of geotextile.
  - d. Manufacturer’s product data/ specification sheet for Water+Air System components (when specified as part of the system).
- .4 Manufacturer's Report: Submit Silva Cell system manufacturer's letter of review and approval of the Project, including Drawings and Specifications, Addenda, Clarifications and Modifications, and for compliance with product installation requirements.
- .5 Qualification Statements:
  - a. Manufacturer:
    - a. Submit list of completed projects demonstrating durability and longevity of in-place systems.

i. Include project name, location, and date of completion.

b. Submit list of third-party approval for stormwater management projects.

b. Installer:

a. Submit documentation of the qualifications of the Silva Cell system installer and their field supervisor, sufficient to demonstrate that both meet the requirements specified in Article 1.05 QUALITY ASSURANCE.

b. Submit list of completed projects of similar scope and scale demonstrating capabilities and experience.

.2 Closeout Submittals: Submit these to the City at completion of installation.

.1 Warranty: Submit manufacturer's warranty, fully executed.

1.5 Quality Assurance

.1 Comply with applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary permits/approvals from these authorities.

.2 Manufacturer Qualifications:

.1 A manufacturer whose product is manufactured in an ISO/TS 16949 compliant and ISO 9001 - 2008 registered factory.

.2 A manufacturer with not less than 100 Silva Cell systems in-place, each system in use for not less than 3 years, confirming durability and longevity of the system.

.3 A manufacturer with documented written approval of their product for use as a stormwater treatment device by a minimum of 3 governmental jurisdictions.

.4 A manufacturer with an established and demonstrated utility service and repair process, including written procedure and photographs demonstrating work.

.5 A manufacturer with a published operating and maintenance manual.

.3 Installer Qualifications: A qualified installer with not less than 5 years of successful experience installing Silva Cell systems or related products and materials, and whose work has resulted in successful installation of underground piping, chambers and vault structures, planting soils, and planter drainage systems of a similar scope and scale in dense urban areas.

.4 Installer's Field Supervisor: A full-time supervisor employed by the installer with not less than 5 years of successful experience similar to that of the installer and present at the Project site when work is in progress. Utilize the same field supervisor throughout the Project, unless a substitution is submitted to and approved in writing by the Contract Administrator.

.5 Mock-Up: Prior to the installation of the Silva Cell system, construct a mock-up of the complete installation at the Project site in the presence of the Contract Administrator.

.1 Size and Extent: Minimum of 100 sq. ft. (9.29 sq. m.) in area and including the complete Silva Cell system installation with subbase, aggregate subbase, drainage installation, Silva Cell decks, posts, and bases, base course aggregate, geotextile, geo-grid, backfill, planting soil, and necessary accessories.

.2 The mock-up area may remain as part of the installed Work at the end of the Project provided that it remains undamaged and meets the requirements of the Drawings and Specifications.

1.6 Delivery, Storage, And Handling

.1 Silva Cell System: Protect Silva Cell system components from damage during delivery, storage and handling.

.1 Store components on smooth surfaces, free from dirt, mud and debris. Store under tarp to protect from sunlight when time from delivery to installation exceeds one week.

.2 Perform handling with equipment appropriate to the size (height) of Silva Cells and site conditions; equipment may include, hand, handcart, forklifts, extension lifts, or small cranes, with care given to minimize damage to Silva Cell bases, posts, decks and adjacent assembled Silva Cells.

.2 Packaged Materials: Deliver packaged materials in original, unopened containers indicating weight, certified analysis, name and address of manufacturer, and indication of conformance with State and Federal laws, if applicable. Protect materials from deterioration during delivery and while on the Project site.

.3 Bulk Materials:

.1 Do not deliver or place backfill, soils, or soil amendments in frozen, wet, or muddy conditions.

.2 Provide protection including tarps, plastic and/or matting between bulk materials and finished surfaces sufficient to protect the finish material.

.3 Bring planting soil to the site using equipment and methods that do not overly mix and further damage soil peds within the soil mix.

.4 Provide erosion-control measures to prevent erosion or displacement of bulk materials and discharge of soil-bearing water runoff or airborne dust to adjacent properties, water conveyance systems, and walkways. Provide additional sediment control to retain excavated material, backfill, soil amendments and planting mix within the Project limits as needed.

1.7 Field Conditions

.1 Existing Conditions: Do not proceed with Work when subgrades, soils and planting soils are in a wet, muddy or frozen condition.

1.8 Warranty

.1 The Contractor shall warrant the Silva Cell system to be free of faults and defects in accordance with the General Conditions, except that the warranty shall be

extended by manufacturer's written warranty against defects in materials and workmanship as follows:

.1 DeepRoot® warrants to the original purchaser of its Silva Cell™ product that such product will be free from defects in materials and workmanship, and perform to DeepRoot's written specifications for the warranted product, when installed and used as specifically provided in the product's installation guidelines for a period of 20 years from the date of purchase. This warranty does not cover wear from normal use, or damage caused by abuse, mishandling, alterations, improper installation and/or assembly, accident, misuse, or lack of reasonable care of the product. This warranty does not apply to events and conditions beyond DeepRoot's control, such as ground subsidence or settlement, earthquakes and other natural events, acts of third parties, and/or Acts of God. If this warranty is breached, DeepRoot® will provide a replacement product. Incurred costs, such as labor for removal of the original product, installation of replacement product, and the cost of incidental or other materials or expenses are not covered under this warranty.

.2 Deeproot® makes no other warranties, express or implied, and specifically disclaims the warranty of merchantability or fitness for a particular purpose. Deeproot® shall not be liable either in tort or in contract for any direct, incidental or consequential damages, lost profits, lost revenues, loss of use, or any breach of any express or implied warranty.

PART 2 – PRODUCTS

2.1 Manufacturer

.1 Acceptable manufacturers:

.1 Product: Silva Cell
Manufacturer: Deeproot
Contact: Michael James (mjames@deeproot.com)
604-687-0899

System components for specific systems may vary from the specifications herein. Submit all system components for review in accordance with the drawings and manufacturer's instructions.

.2 Or approved equal

2.2 Description

.1 The term Silva Cell shall be used to refer to a single Silva Cell.

.2 Silva Cells shall be designed for the purpose of growing healthy trees and providing stormwater management.

.3 Silva Cells shall be modular, structural systems.

.4 Each Silva Cell shall be structurally independent from all adjacent Silva Cells for incorporating utilities and other site features as well as for future repairs.

.5 Silva Cells shall be capable of supporting loads up to and including AASHTO H-20 (United States) or CSA-S6 87.5 kN (Canada) when used in conjunction with approved pavement profiles.

.6 Silva Cells shall be open on all vertical faces and horizontal planes and shall have no interior walls or diaphragms.

.7 Silva Cells shall be capable of providing a large, contiguous, continuous volume of planting soil that does not inhibit or prevent the following:
- .1 Placement of planting soil
- .2 Walk through compaction
- .3 Compaction testing of planting soil, in one place
- .4 Movement and growth of roots
- .5 Movement of water within the provided soil volume, including lateral capillary movement
- .6 Installation and maintenance of utilities placed within, adjacent to, or below the Silva Cell.

.8 Silva Cells shall be able capable of being filled with a variety of soil types and soils that include peds 2 inches (50 mm) or larger in diameter as is appropriate for the application, location of the installation, and tree species.

2.3 Silva Cell Materials and Accessories

.1 Silva Cell System Components: Each "Silva Cell" soil cell module (hereafter Silva Cell or "cell") is composed of one base, 6 post assemblies, and one deck.
- .1 3x Silva Cell System
  - a. Components: One base, twelve posts (a combination of six 1x posts and six 2x posts), and one deck.
  - b. Assembled Dimensions (Each Cell): 1200 mm long by 600 mm wide by 1092 mm high).

.2 Silva Cell Materials and Fabrication:
- .1 Bases and Posts: Homopolymer polypropylene.
- .2 Decks: Fiberglass reinforced, chemically-coupled, impact modified polypropylene.

.3 Manufacturer's Related Silva Cell Installation Accessories:
- .1 Strongbacks: An accessory designed to stabilize the Silva Cell posts temporarily, during soil placement, and removed for reuse prior to placing decks.
- .2 Anchoring Spikes: 10” landscape spike for securing assembled Silva Cells to subbase

2.4 Related Products

.1 Root Barrier: Recyclable, black, injection molded panels manufactured with a minimum 50 percent post-consumer recycled polypropylene plastic with UV inhibitors, and integrated zipper joining system which allows instant assembly by

sliding one panel into another; for redirecting tree roots down and away from hardscapes.

.1 Panel sizes:

a. No. UB12-2: 24 inches long by 12 inches deep by 0.080 inches thick (61 cm long by 30 cm deep by 2.03 mm thick); for use with 1x systems and for pavement profiles less than 12 inches (30 cm) deep.

b. No. UB18-2: 24 inches long by 18 inches deep by 0.080 inches thick (61 cm long by 46 cm deep by 2.03 mm thick); for use with 2x and 3x systems, and for pavement profiles 12 inches or more in depth.

.2 Products meeting this specification:

a. DeepRoot Tree Root Barrier (DeepRoot Green Infrastructure, LLC)

.2 Water+Air System: Used as a standalone system or in conjunction with the Silva Cell, the Water+Air System enables water and air to be directly added to tree roots and the surrounding soil system.

.1 Water+Air System:

a. Cast aluminum body
b. Stainless steel grate
c. Height -3 ¾” (85mm)
d. Compatible with 3” and 4” (80mm and 100mm) pipe

.3 Geogrid: CW3135

.4 Geotextile: CW3130

.5 Plastic Cable Ties: A tensioning device or tool used to tie similar or different materials together with a specific degree of tension.

2.5 Other Related Materials

.1 Wood Blocking: Nominal dimensioned untreated lumber used for spacing assembled Silva Cells.

.2 Aggregate Subbase (Below Silva Cell Base):

.1 Aggregate as per Section 32 11 23 Aggregate Base Courses and CW3110.

.3 Aggregate Base Course (Above Silva Cell Deck):

.1 Same as aggregate subbase specified above.

.4 Backfill Material (Adjacent to Silva Cells): Clean, compactable, coarse grained fill soil free of organic material, trash and other debris, and free of toxic material injurious to plant growth.

.5 Planting Soil: Refer to Section 32 94 56 - Planting Soil for Silva Cells.

PART 3 – EXECUTION

3.1 Examination

.1 Examine the conditions under which the Silva Cells are to be installed.
- .1 Carefully check and verify dimensions, quantities, and grade elevations.
- .2 Carefully examine the Drawings to become familiar with the existing underground conditions before digging. Verify the location of aboveground and underground utility lines, infrastructure, other improvements, and existing trees, shrubs, and plants to remain including their root system.
- .3 Notify the Contractor and the Contract Administrator in writing in the event of conflict between existing and new improvements, of discrepancies, and other conditions detrimental to proper and timely
- .4 completion of the installation. Obtain written approval of changes to the Work prior to proceeding. Proceed with installation only after changes have been made and unsatisfactory conditions have been corrected.

3.2 Preparation

.1 Take proper precautions as necessary to avoid damage to existing improvements and plantings.

.2 Prior to the start of Work, layout and stake the limits of excavation and horizontal and vertical control points sufficient to install the complete Silva Cell system.The layout shall be calculated to include shift in layout locations due to depth and the slope of the cells.

.3 Coordinate installation with other trades that may impact the completion of the Work.

3.3 Temporary Protection

.1 Protect open excavations and Silva Cell system from access and damage both when Work is in progress and following completion, with highly visible construction tape, fencing, or other means until related construction is complete.

.2 Do not drive vehicles or operate equipment over the Silva Cell system until the final surface material has been installed.

3.4 Excavation

.1 General: Excavate to the depths and shapes indicated on the Drawings and in accordance with CW3170. Provide smooth and level excavation base free of lumps and debris.

.2 Confirm that the depth of the excavation is accurate and includes the full section of materials required to place the subbase aggregate, Silva Cell, and pavement profile as indicated on the Drawings.

.3 Over-excavate beyond the perimeter of the Silva Cell to allow for:
.1 The extension of aggregate subbase beyond the Silva Cell layout as shown on the Drawings.
.2 Adequate space for proper compaction of backfill around the Silva Cell system.

.4 If unsuitable subgrade soils are encountered, consult the City's geotechnical consultants for directions on how to proceed.

.5 If conflicts arise during excavation, notify the Contract Administrator in writing and make recommendations for action. Proceed with Work only when action is approved in writing.

3.5 Subgrade Compaction

.1 Compact subgrade to a minimum of 95 percent of maximum dry density at optimum moisture content in accordance with ASTM D698, Standard Proctor Method, Specification CW3110, or as approved by the City’s geotechnical representative.

.2 Do not exceed 10 percent slope for subgrade profile in any one direction. If the 10 percent slope is exceeded, contact manufacturer's representative for directions on how to proceed.

3.6 Installation of Geotextile over Subgrade

.1 Install geotextile over compacted subgrade.
.1 Lay geotextile flat with no folds or creases.
.2 Install the geotextile with a minimum joint overlap of 18 inches (450 mm).

3.7 Installation of Sub Drains in Soil Cell System

.1 Lay out the location of the subdrains within the planting system as depicted in the Drawings. Adjust the alignments to conform to the final locations of sleeves and risers. Do not locate drain lines within 150mm of the edge of any soil cell post.

.2 Ensure positive drainage toward intended outfalls. Excavate a trench a minimum of 300mm wide to a depth required to provide positive drainage from the high points of the system to the outfall or connection point to storm sewer. Eliminate dips or rises that will trap water. Minimum slope shall be 1%.

3.8 Installation of Inspection Risers

.1 Install inspection risers to finish grade, where indicated on the Drawings.
.2 Install manufacturer’s PVC solid “T’s,” elbows, and reducers as per Drawing. Use the proper sized “T’s” and reducers.
.3 Extend risers into sub base aggregate and or make connections to drain lines where indicated on the Drawings.
.4 Where inspection risers are indicated to be placed on top of the soil cell deck, assemble riser and fittings to dimensions requires such that the rim of the riser is flush with the paving. Set the rim top with a slope consistent with the slope of the

pavement. In all cases, ensure risers present no hazard to pedestrians or equipment.

.5 Brace all risers while backfill and paving is being installed to secure its location and elevation.

.6 Install clean-out caps on top of each riser flush with finish grade or pavement surface.

3.9 Installation of Aggregate Subbase Below Silva Cell Bases

.1 Install aggregate subbase to the depths indicated on the Drawings.

.2 Extend subbase aggregate a minimum of 6 inches (150 mm) beyond the base of the Silva Cell layout.

.3 Compact aggregate subbase to a minimum of 95 percent of maximum dry density at optimum moisture content in accordance with ASTM D698, Standard Proctor Method.

.4 Do not exceed 10 percent slope on the surface of the subbase. Where proposed grades are greater than 10 percent, step the Silva Cells to maintain proper relation to the finished grade.

3.10 Installation of Silva Cell Base

.1 Install the Silva Cell system in strict accordance with manufacturer's instructions and as specified herein; where requirements conflict or are contradictory, follow the more stringent requirements.

.2 Layout and Elevation Control:

.1 Provide layout and elevation control during installation of the Silva Cell system to ensure that layout and elevations are in accordance with the Drawings.

.3 Establish the location of the tree openings in accordance with the Drawings. Once the trees are located, mark the inside dimensions of the tree openings on the prepared subbase.

.4 Locate and mark other Project features located within the Silva Cell layout (e.g. light pole bases, utility pipes). Apply marking to identify the extent of the Silva Cell layout around these features. Follow the layout as shown on the Drawings to ensure proper spacing of the Silva Cell bases. Refer to the Drawings for offsets between these features and the Silva Cells.

.5 Check each Silva Cell component for damage prior to placement. Reject cracked or chipped units.

.6 Place the Silva Cell bases on the compacted aggregate subbase. Start at the tree opening and place Silva Cell bases around the tree openings as shown on the Drawings.

.7 Working from tree opening to tree opening, place Silva Cell bases to fill in the area between tree openings.

.1 Maintain spacing no less than 1 inch (25 mm) and no more than 6 inches (150 mm) apart, assuming geotextile covering the decks meets the specifications in section 2.4.3.

.8 Follow the Silva Cell layout plan as shown on the Drawings.

.9 Install Silva Cell bases around, over, or under existing or proposed utility lines, as indicated on the Drawings.

.10 Level each Silva Cell base as needed to provide full contact with subbase. Adjust subbase material, including larger pieces of aggregate, so each base sits solidly on the surface of the subbase. Silva Cell bases that rock or bend over any stone or other obstruction protruding above the surface of the subbase material are not allowed. Silva Cell bases which bend into dips in the subbase material are not allowed. The maximum tolerance for deviations in the plane of the subbase material under the bottom of the horizontal beams of each Silva Cell base is 1/4 inch in 4 feet (6 mm in 1200 mm).

.11 Anchor Silva Cell base with 2 anchoring spikes per base.
.1 For applications where Silva Cells are installed over waterproofed structures, use wood blocking or similar spacing system consistent with requirements of the waterproofing system to maintain required spacing.

3.11 Installation of Silva Cell Posts

.1 3x Silva Cell System:
.1 Attach 2x posts to the installed Silva Cell base. Each base will receive six 2x posts. Place the end of the post with tabs into the base. Rotate post clockwise to snap in place.
.2 Following the placement of backfill and planting soil within the 2x posts, add a 1x post extension as described herein. A 2x post, used in combination with a 1x post is considered a 3x post assembly.

3.12 Installation of Strongbacks, Geogrid, Backfill, and Planting Soil

.1 For Silva Cell systems that have a perforated drain line located inside or adjacent to the system, consult Drawings for layout and details.

.2 Install strongbacks on top of the Silva Cell posts by snapping into place over installed posts prior to installing planting soil and backfill.
.1 Strongbacks are required only during the placement and compaction of the planting soil and backfill.
.2 Move strongbacks as the Work progresses across the installation.
.3 Remove strongbacks prior to the installation of the Silva Cell decks.

.3 Install geogrid around the perimeter of the Silva Cell system where the compacted backfill and planting soil interface.
.1 Do not place geogrid between the edge of the Silva Cells and adjacent planting areas.

.2 Cut the geogrid to allow for a 6-inch (150-mm) overlap at the Silva Cell base and a 12-inch (300-mm) overlap at the Silva Cell deck.
.3 Provide a minimum 12-inch (300-mm) overlap between adjacent sheets of geogrid.
.4 Secure geogrid with cable ties below the top of the posts, along the post ridges.

.4 Place the first lift of backfill material loosely around the perimeter of the Silva Cell system, between the geogrid and the sides of the excavation. Place backfill to approximately the midpoint of the Silva Cell post. Do not compact.

.5 Place the first lift of planting soil in the Silva Cell system to approximately the midpoint of the Silva Cell post.
.1 Level the planting soil throughout the system.
.2 Walk-through the placed planting soil to remove air pockets and settle the soil.
a. Lightly compact soils by walking through the soil following placement.
b. Walk through compaction shall result in 75-85 percent of maximum dry density in accordance with ASTM D698, Standard Proctor Method. Do not exceed root limiting compaction for the given soil type.

.6 Compact the first lift of backfill material, previously spread, to 95 percent of maximum dry density in accordance with ASTM D698, Standard Proctor Method or in accordance with Project Specifications for hardscape areas, whichever is greater.

.7 Add and compact additional backfill material so that the final finished elevation is at approximately the same level of the placed planting soil within the Silva Cells.
.1 Maintain the geogrid between the Silva Cell system and the backfill material at all times.

.8 Place the second lift of backfill material loosely around the perimeter of the Silva Cell system, between the geogrid and the sides of the excavation so that the material is 2 to 3 inches below the top of the posts. Do not compact

.9 Place the second lift of planting soil inside of the Silva Cell to the bottom of the strongbacks. Walk through compact.

.10 Remove strongbacks, place one 1x posts into each of the previously installed 2x posts. Rotate clockwise to snap in place, forming a 3x post assembly.

.11 Immediately reinstall strongbacks on top of the post assembly.

.12 Repeat process of alternately placing backfill and planting soil so that elevation of the compacted backfill and the walked-through planting soil are just below the level of the strongbacks.

3.13 Installation of Irrigation and Water Harvesting System

.1 Install irrigation and water harvesting system in accordance with the Drawings and Specifications. Remove only the minimum number of strongbacks needed to accommodate the Work and reinstall them immediately upon completion to maintain alignment of posts.

3.14 Installation of Silva Cell Deck

.1 Obtain final approval by the Contract Administrator of planting soil installation prior to installation of the Silva Cell decks.

.2 Remove strongbacks, level out the planting soil, and immediately install decks over the posts below. Place deck over the top of the posts. Push decks down until the deck clips lock into the posts, snapping the deck into place.

.3 Fold the 12 inches (300 mm) of geogrid onto the top of the decks.

3.15 Final Backfill Placement and Compaction

.1 Place and compact final lift of backfill material to 95 percent of maximum dry density in accordance with ASTM D698, Standard Proctor Method, such that the backfill is flush with the top of the installed deck. Do not allow compacting equipment to come in contact with the decks.

3.16 Installation of Geotextile and Aggregate Base Course Over The Deck

.1 Ensure geotextile meets the specifications in section 2.4.3

.2 Place geotextile over the top of the deck and extend to the edge of the excavation. Overlap joints a minimum of 18 inches (450 mm). Leave enough slack in the geotextile for the aggregate base course to push the geotextile down in the gaps in between the decks.

.3 Install the aggregate base course (including aggregate setting bed if installing unit pavers) over the geotextile immediately after completing the installation of the fabrics. Work the aggregate from one side of the layout to the other so that the fabric and aggregate conform to the Silva Cell deck contours.

.4 Maintain equipment used to place aggregate base course completely outside the limits of the Silva Cell excavation area to prevent damage to the installed system.

.5 For large or confined areas, where aggregate cannot easily be placed from the edges of the excavated area, obtain approval for the installation procedure and types of equipment to be used in the installation from the Silva Cell manufacturer.

.6 Compact aggregate base course(s) to 95 percent of maximum dry density in accordance with ASTM D698, Standard Proctor Method. Utilize a vibration or plate compactor with a maximum weight of 800 lbs (362.87 kg).

.7 Do not drive vehicles or operate equipment over the completed aggregate base course

3.17 Installation of Concrete Curbs at Tree Openings, Aggregate Subbase And Pavement Above Silva Cell System

.1 Place concrete curbs and concrete base along planting areas and tree openings as shown on the Drawings to retain the aggregate base course from migrating into the planting soil.

.2 When staking concrete forms (e.g. concrete base around the tree openings), prevent stakes from penetrating the Silva Cell decks.

.3 Turn down edge of concrete paving to the Silva Cell deck along the edges of tree openings or planting areas to retain the aggregate base course material.

.4 When paving type is a unit paver or other flexible material, provide a concrete curb under the paving at the edge of the Silva Cell deck to retain the aggregate base course material at the tree opening.

.5 Place paving material over Silva Cell system in accordance with the Drawings.
- .1 The Silva Cell system does not fully meet loading strength until the final paving is installed. Do not operate construction equipment on top of the Silva Cell system until paving installation has been completed.

.6 Use care when placing paving or other backfill on top of Silva Cell system to prevent damage to the Silva Cell system or its components.

3.18 Installation of Root Barriers

.1 Install root barrier in accordance with manufacturer's installation instructions.

3.19 Installation of Planting Soil Within the Tree Planting Area

.1 Remove rubble, debris, dust and silt from the top of the planting soil within the tree opening that may have accumulated after the initial installation of the planting soil within the Silva Cells.

.2 Install additional planting soil within the tree openings, to the depths indicated on the Drawings.
- .1 Use the same soil used within the Silva Cells for planting soil within the tree openings.

.3 Compact planting soil under the tree root ball to between 85 and 90 percent of maximum dry density in accordance with ASTM D698, Standard Proctor Method, to prevent settlement of the root ball.

.4 Place trees in accordance with the Drawings.

3.20 Protection

.1 Keep construction traffic away from the limits of the Silva Cells until the final pavement profile is in place. The Silva Cell system does not fully meet loading strength until the final paving is installed.
  .1 Do not operate equipment directly on top of the Silva Cell system until paving installation has been completed.
  .2 Provide fencing and other barriers to prevent vehicles from entering into the Silva Cell area.

.2 When the Silva Cell installation is completed and the permanent pavement is in place, limit traffic and construction related activities to only loads less than the design loads.

3.21 Clean Up

.1 Perform clean up during installation and upon completion of the Work. Maintain the site free of soil, sediment, trash and debris. Remove excess soil materials, debris, and equipment from the site following completion of the Work of this Section.

.2 Repair damage to adjacent materials and surfaces resulting from installation of this Work using mechanics skilled in remedial work of the construction type and trades affected.

END OF SECTION

PART 1 – GENERAL

1.1 Summary

.1 Section Includes:
- .1 Labour, materials, tools, supplies, equipment, facilities, transportation and services necessary for, and incidental to performing all operations in connection with furnishing, and delivery of planting soil and /or the modification of existing site soil for use as planting soil within the Silva Cell system.

.2 The scope of Work in this Section includes, but is not limited to, the following:
- .1 Locate, purchase, deliver and install imported planting soil and soil amendments.

.3 Related Requirements:
- .1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 0I Specifications, apply to Work of this Section.
- .2 Section 32 93 00 – Planting of Trees, Shrubs, and Ground Covers
- .3 Section 32 94 51 – Soil Cells
- .4 City of Winnipeg Tree Planting and Maintenance Specification
- .5 City of Winnipeg Tree Planting Standards, Details and Specifications – Downtown Area and Regional Streets

1.2 References

.1 Definitions:
- .1 COMPACTION: The density of soil measured as oven dry weight divided by volume.
- .2 EXISTING SOIL: Mineral soil existing at the locations of proposed planting of area designated for the installation of Silva Cells after the majority of the construction within and around the planting or Silva Cell site is completed and just prior to the start of Work to excavate the soil
- .3 LANDSCAPE ARCHITECT: The person or entity, employed by the City to represent their interest in the review of the Work.
- .4 PED: Clump or clod of soil held together by a combination of clay, organic matter, and fungal hyphae, retaining the original structure of the harvested soil.
- .5 SCREENED SOIL: Soil that has been processed through a metal screen to remove or break apart soil peds (clumps /clods), roots, rocks and debris and remove larger physical items in the soil not permitted by the specification.
- .6 SILVA CELLS: Structural paving support system defined in Section 32 94 51 Soil Cells.
- .7 SUBGRADE: Surface or elevation of subsoil remaining after completing excavation, or top surface of fill or backfill, before placing planting soil.

.2 Reference Standards:
- .1 ASTM International (ASTM)

.1 ASTM C33 Standard Specification for Concrete Aggregates- Fine Aggregates.

.2 The Soil Science Society of America.
.1 Methods of Soil Analysis, most current edition

.3 United States Composting Council *www.compostingcouncil.org and* http://compostingcouncil.org/admin/wp-content/plugins/wp-*pdfupload/pdf/191/LandscapeArch_Specs.pdf.*

.4 United States Department of Agriculture, Natural Resources Conservation Service
.1 National Soil Survey Handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_054242

1.3 Performance Requirements

.1 Action Submittals: Submit these to the Contract Administrator for review and acceptance not less than 60 days prior to start of installation of materials and products specified in this Section.
.1 Product Data: For each type of product, submit manufacturer's product literature with technical data sufficient to demonstrate that the product meets these specifications.
.1 For each compost product submit the manufactures certification that the compost meets the requirements for US Compost Council STA/TMECC criteria for “Compost as a Landscape Backfill Mix Component” and other requirements of the Specification.
.2 For coarse sand product submit the following analysis by a recognized laboratory:
a. pH
b. Manufacturers Fines Modulus Index
c. Particle size distribution (percent passing the following sieve sizes):

3/8 inch	(9.5 mm)
No 4	(4.75mm)
No 8	(2.36 mm)
No 16	(1.18 mm)
No 30	(0.60 mm)
No 50	(0.30 mm)
No 100	(0.15 mm)
No 200	(0.075 mm)

.2 Test and Evaluation Reports:
.1 Include analysis of bulk materials including soils and aggregates, by a recognized laboratory that demonstrates that the materials meet the Specification requirements.
.2 Submit required soil test analysis report for each sample of imported topsoil, existing site soil, and planting soil mixes from an approved soil-testing laboratory as follows:
a. Do not submit planting soil mixes, for testing until all topsoil, compost, and coarse sand have been approved.

b. If tests fail to meet the Specifications, obtain other sources of material, retest and resubmit until accepted by the Contract Administrator.
c. All testing shall be performed following the requirements of *Methods of Soil Analysis*, The Soil Science Society of America.
d. Provide a particle size analysis (percent dry weight) and USDA soil texture analysis. Soil testing of planting soil mixes shall also include USDA gradation distribution of gravel, coarse sand, medium sand, and fine sand in addition to silt and clay. Reports of particle size distribution shall use USDA size nomenclature and analysis protocols.
e. Provide the following other soil properties:
    a. pH and buffer pH
    b. Percent organic content by oven dried weight.
    c. Nutrient levels by parts per million including: phosphorus, potassium, magnesium, manganese, iron, zinc and calcium. Nutrient test shall include the testing laboratory recommendations for supplemental additions to the soil for optimum growth of the plantings specified.
    d. Soluble salt by electrical conductivity of a 1:2 soil water sample measured in Milliohm per cm.
f. All soil testing will be at the expense of the Contractor.

.3 Samples:
.1 Each sample shall be double bagged packaged in two plastic zip loc style bags. Each bag shall be clearly marked with the project name, date, contractors name and telephone number, and product name.
.2 Samples of all soil and soil mixes shall be submitted at the same time as the particle size and physical analysis of that material.
.3 Samples will be reviewed for appearance only.
.4 Provide samples for the following products.
    a. One-gallon (3.79-liter) sample of all soil types.

.4 Qualification Statements:
.1 Soil Suppler:
    a. Submit documentation of the qualifications of the planting soil supplier and their field supervisor, sufficient to demonstrate that both meet the requirements specified in Article 1.05 QUALITY ASSURANCE.
    b. Submit list of completed projects of similar scope and scale demonstrating capabilities and experience.

1.4 Quality Assurance

.1 Supplier: Soil mixes shall be supplied by a firm that specializes in the production of mixes of planting soils and have at least 5 years experience in providing soil mixes soils to projects of similar size and scope to this Work.

.2 Soil Testing Laboratory Qualifications: The testing laboratory shall specialize in agricultural soil testing and be a member of the Soil Science Society of America's, North American Proficiency Testing Program (NAPT). Testing results for soil particle size shall be reported using USDA sizes for sand, silt, and clay.

1.5 Delivery, Storage, And Handling

.1 Weather: Do not mix or deliver soil when frozen or muddy.

.2 Protect soil and soil stockpiles, from wind, rain and washing that can erode soil or separate fines and coarse material, and contamination by chemicals, dust and debris that may be detrimental to plants or soil drainage. Confine delivered materials to neat piles in areas coordinated with the site supervisor. Cover stockpiles with plastic sheeting or fabric at the end of each Workday.

.3 All manufactured packaged products and material shall be delivered to the site in unopened containers and stored in a dry enclosed space suitable for the material and meeting all environmental regulations.

.1 Biological and chemical additives shall be protected from extreme humidity, cold, or heat. All products shall be freshly manufactured and dated for the year in which the products are to be used. Chemical amendments shall have original labels intact and legible, stating the guaranteed chemical analysis.

PART 2 – PRODUCTS

2.1 Planting Soil Medium

.1 The planting soil shall be topsoil that complies with CW 3540, Section 5.2.

.1 Further to CW 3540 section 5.2, planting soil shall contain maximum ten percent (10%) organic matter (peat, rotted manure or composted material).

.2 At the discretion of the Contractor Administrator, planting soil may be subject to tests for nitrate, phosphate, potassium, sulphate, pH, E.C. (salinity), and volume of organic matter, by a testing laboratory designated by the Contract Administrator.

.3 The Contract Administrator reserves the right to reject planting soil not conforming to the requirements of these Specifications.

2.2 Fertilizer

.1 If noted by the soil test recommendations, add slow-release, organic fertilizer based on soil test and plant requirements.

.2 Submittal Requirements: Provide manufacturer’s literature that the product meets the requirements.

PART 3 – EXECUTION

3.1 Installation Of Planting Soil In Soil Cells

.1 Refer to Section 32 94 51 – Soil Cells

END OF SECTION

PART 1 – GENERAL

1.1 Section Includes

.1 The scope of work includes the supply and installation of all manholes and structures, including but not limited to:

.1 Manholes.

.2 Catch Basins.

.3 Double Check Valve Assembly and Meter CSP Enclosure.

.4 Joint Sealing.

.5 Frames and Covers.

.6 Related Accessories.

1.2 Submittals

.1 Submit shop drawings for review by the Contract Administrator, including but not limited to:

.1 Precast concrete manholes, including cement type, sections, lengths, benching, adjusting rings and pipe connection locations.

.2 Precast concrete catch basins, including cement type, sections, lengths, benching, adjusting rings and pipe connection locations.

.3 Waterproofing.

.4 Frames and Covers.

.5 Horizontal joint sealing materials.

.6 Pipe connections through manhole wall joint details.

.7 Ladder rungs.

.8 Double check valve and meter assembly.

.9 CSP Enclosure, including cover assembly.

1.3 References

.1 AASHTO M 199M/M 199-22; Standard Specification for Precast Reinforced Concrete Manhole Sections.

.2 ASTM A48/A48M-22; Specification for Gray Iron Castings.

.3 ASTM A615/A615M-22; Standard Specification for Deformed and Plan Carbon Steel Bars for Concrete Reinforcement.

.4 ASTM C443-21; Standard Specification for Joints for Concrete Pipe and Manholes Using Rubber Gaskets.

.5 ASTM C478M-20; Standard Specification for Circular Reinforced Concrete Manhole Sections (Metric).

.6 ASTM C578-22; Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

.7 ASTM C923-20; Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals".

.8 ASTM C990-09(2019); Standard Specification for Joins for Concrete Pipes, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

.9 ASTM C1107/C1107M-20; Standard Specification for Packages Dry, Hydraulic-Cement Grout (Nonshrink).

.10 ASTM D4101-17e1; Standard Specification for Polypropylene Injection and Extrusion Materials.

.11 CAN/CSA A23.1-19; Concrete Materials and Methods for Construction.

.12 CAN/CSA A165 Series-14 (R2019); CSA Standards on concrete masonry units.

.13 CSA A257 Series-19; Standards for Concrete Pipe and Manhole Sections.

.14 CSA A3000-18; Cementitious materials compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

PART 2- PRODUCTS

2.1 Manholes

.1 Manholes shall conform to the latest edition of City of Winnipeg Standard Construction Specification CW 2130 Gravity Sewers.

2.2 Catch Basins

.1 Catch Basins shall conform to the latest edition of City of Winnipeg Standard Construction Specification CW 2130 Gravity Sewers.

2.3 Frame and Cover Assemblies

.1 Frame and cover assemblies shall conform to the latest edition of City of Winnipeg Standard Construction Specification CW 2130 Gravity Sewers.

2.4 Double Check Valve and Meter Assembly

.1 Double Check Valve and Meter Assembly shall conform to City of Winnipeg Standard Detail SD 241

PART 3- EXECUTION

3.1 Installation

.1 Install all works in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 2130 Gravity Sewers.

END OF SECTION

PART 1 – GENERAL

1.1 Section Includes

.1 The work shall consist of the supply and labour, materials and equipment necessary for the installation of underground piping, including:

.1 Water mains.

.2 Valves and valve boxes.

.3 Fire Hydrants.

.4 Fittings.

.5 Hydrostatic testing equipment and procedures.

.6 Chlorination and disinfection procedures.

1.2 Submittals

.1 Submit shop drawings and product data for review by the Contract Administrator. Submittals to include but not limited to:

.1 Pipe and fittings.

.2 Valves and valve boxes.

.3 Zinc anode corrosion protection.

.4 Hydrants.

.5 Joints.

.6 Water main appurtenances.

1.3 References

.1 ASTM B418-16a(2021); Standard Specification for Cast and Wrought Galvanic Zinc Anodes.

.2 ASTM D1603-20; Standard Test Method for Carbon Black Content in Olefin Plastics.

.3 ASTM D2683-20; Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Fittings.

.4 ASTM D2837-22; Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.

.5 ASTM D3261-16; Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.

.6 ASTM D3350-21; Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

.7 ASTM F714-22; Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter.

.8 ASTM F1055-16a(2022); Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing.

.9 ASTM F1290-19; Standard Practice for Electrofusion Joining Polyolefin Pipe and Fittings.

.10 ASTM F2206-19; Standard Specification for Fabricated Fittings of Butt-Fused Poltethylene (PE).

.11 ASTM F2620-20ae2; Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.

.12 AWWA C151/A21.51-17; Ductile Iron Pipe, Centrifugally Cast, for Water.

.13 AWWA C207-18; Steel Pipe Flanges for Waterworks Service, Sizes 4 in. Throught 144 In. (100 mm Through 3,600 mm)

.14 AWWA C509-23; Resilient-Seated Gate Valves for Water-Supply Service.

.15 AWWA C906-21 Polyethylene (PE) Pressure Pipe and Fittings, 4 in Thru 65 in (100 mm Through 1650 mm), for Waterworks.

.16 CAN/CSA B137:20; Thermoplastic Pressure Piping Standards Package.

.17 CAN/ULC S701.1-2022; Standard for Thermal Insulation, Polystyrene, Boards.

.18 CSA A23.1/A23.2:19; Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practice for Concrete.

.19 NSF 61; Drinking Water System Components – Health Effects.

.20 PPI HSB-R-01/2015; The Nature of the 0.63 Design Factor for Qualifies Polyethylene Pipe Compounds.

.21 PPI TN-34; Installation Guidelines for Electrofusion Couplings 14" and Larger.

.22 PPI TR-3; Policies and Procedures for Developing Hydrostatic Design Basis (HDB), Pressure Design Basis (PDB), Strength Design Basis (SDB), and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe.

.23 Standards Council of Canada (SCC)

PART 2- PRODUCTS

2.1 Water Pipe and Fittings - PVC

.1 Water pipe and fittings shall conform to the latest edition of City of Winnipeg Standard Construction Specification CW 2110 Water Mains.

.1 Use DR 18 Class 235 C900 PVC Piping.

.2 Use PVC fittings to AWWA standards of the same materials as the pipe.

2.2 Water Main Appurtenances

.1 Water main appurtenances shall conform to the latest edition of City of Winnipeg Standard Construction Specification CW 2110 Water Mains.

2.3 Valves and Valve Boxes

.1 Valves and valve boxes shall conform to the latest edition of City of Winnipeg Standard Construction Specification CW 2110 Water Mains.

2.4 Hydrants

.1 Hydrants shall conform to the latest edition of City of Winnipeg Standard Construction Specification CW 2110 Water Mains.

PART 3- EXECUTION

3.1 Construction Methods

.1 Complete all works in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 2110 Water Mains.

3.2 Flushing, Testing and Disinfection

.1 Complete all works in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 2125 Flushing, Hydrostatic Leakage Testing and Disinfection of Watermains and Water Systems.

END OF SECTION

PART 1 – GENERAL

1.1 Section Includes

.1 The scope of work generally described hereunder shall include the supply, installation and CCTV inspection and cleaning requirements for all sanitary sewer piping and land drainage sewer piping, which includes but is not limited to:

.1 Sanitary sewer piping.

.2 Land drainage sewer piping.

.3 Cleaning and inspection of sewers and manholes for the purpose of verifying new sewer construction prior to acceptance. Inspection to use internal video equipment for the purpose of assessing thoroughness of cleaning and observing/recording structural defects and construction features.

1.2 Submittals

.1 Submit shop drawings and product data for review by the Contract Administrator. Submittals to include, but are not limited to:

.1 Pipe and fittings (including plugs and caps).

.2 Joints – all materials, qualifications and procedures as applicable.

.3 Cleaning and video inspection equipment, procedures and reporting.

.4 Detailed work schedule for wetland and native grass planting for restoration of stormwater retention basin outfall.

1.3 References

.1 ASTM B418-16a(2021); Standard Specification for Cast and Wrought Galvanic Zinc Anodes.

.2 ASTM D1603-20; Standard Test Method for Carbon Black Content in Olefin Plastics.

.3 ASTM D2683-20; Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Fittings.

.4 ASTM D2837-22; Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.

.5 ASTM D3261-16; Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.

.6 ASTM D3350-21; Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

.7 ASTM F714-22; Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter.

.8 ASTM F1055-16a(2022); Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing.

.9 ASTM F1290-19; Standard Practice for Electrofusion Joining Polyolefin Pipe and Fittings.

.10 ASTM F2206-19; Standard Specification for Fabricated Fittings of Butt-Fused Poltethylene (PE).

.11 ASTM F2620-20ae2; Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.

.12 AWWA C151/A21.51-17; Ductile Iron Pipe, Centrifugally Cast, for Water.

.13 AWWA C207-18; Steel Pipe Flanges for Waterworks Service, Sizes 4 in. Throught 144 In. (100 mm Through 3,600 mm)

.14 AWWA C509-23; Resilient-Seated Gate Valves for Water-Supply Service.

.15 AWWA C906-21 Polyethylene (PE) Pressure Pipe and Fittings, 4 in Thru 65 in (100 mm Through 1650 mm), for Waterworks.

.16 CAN/CSA B137:20; Thermoplastic Pressure Piping Standards Package.

.17 CAN/ULC S701.1-2022; Standard for Thermal Insulation, Polystyrene, Boards.

.18 CSA A23.1/A23.2:19; Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practice for Concrete.

.19 NSF 61; Drinking Water System Components – Health Effects.

.20 PPI HSB-R-01/2015; The Nature of the 0.63 Design Factor for Qualifies Polyethylene Pipe Compounds.

.21 PPI TN-34; Installation Guidelines for Electrofusion Couplings 14" and Larger.

.22 PPI TR-3; Policies and Procedures for Developing Hydrostatic Design Basis (HDB), Pressure Design Basis (PDB), Strength Design Basis (SDB), and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe.

.23 Standards Council of Canada (SCC)

PART 2- PRODUCTS

2.1 Sanitary Sewer – Pipe and Fittings

.1 Sanitary sewer piping shall conform to the latest edition of City of Winnipeg Standard Construction Specification CW 2130 Gravity Sewers

.1 Use DR 35 PVC pipe,

.2 Fittings shall be PVC of the same SDR as the pipe.

2.2 Land Drainage Sewer – Pipe and Fittings

.1 Sanitary sewer piping shall conform to the latest edition of City of Winnipeg Standard Construction Specification CW 2130 Gravity Sewers

.1 Use DR 35 PVC pipe,

.2 Fittings shall be PVC of the same SDR as the pipe.

2.3 Land Drainage Sewer – Outfall Restoration

.1 Wetland Plant Material

.1 Revegetation shall be approved by Native Plant Solutions and submitted to the Contract Administrator.

.2 Growth Media

.1 Growth media shall be approved by Native Plant Solutions and submitted to the Contract Administrator.

.3 Native Grass Seed

.1 Seed mix shall be approved by Native Plant Solutions and submitted to the Contract Administrator.

.4 Rooted Flower Specimens

.1 Rooted Flower Specimens shall be approved by Native Plant Solutions and submitted to the Contract Administrator.

.5 Topsoil

.1 Topsoil shall be approved by Native Plant Solutions and submitted to the Contract Administrator.

PART 3- EXECUTION

3.1 Construction Methods

.1 Complete all works in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 2130 Gravity Sewers.

3.2 Sewer Cleaning and Video Inspection

.1 Complete sewer cleaning and video inspection in accordance with the latest edition of City of Winnipeg Standard Construction Specification CW 2130 Gravity Sewers.

3.3 Land Drainage Sewer Outfall Installation

.1 Coordinate with the City of Winnipeg for installation of the land drainage sewer outfall into the existing stormwater retention basin.

.2 Be responsible for all works necessary for installation of the land drainage sewer outfall, including but not limited to cofferdam installation, temporary dewatering and pumping, outfall installation, bedding, backfilling and restoration.

.3 Complete works to the satisfaction of the City of Winnipeg.

.4 Ensure naturalized plantings within and surrounding the stormwater retention basin are restored to original or better condition, to the satisfaction of the Contract Administrator and the City of Winnipeg.

.1 Naturalized plant species shall be of the same species as are removed during the installation of the land drainage sewer outfall.

.2 Planting of naturalized vegetation shall be conducted by qualified personnel. Submit planting plan for review by the Contract Administrator and the City of Winnipeg a minimum of 15 business days prior to installation of the land drainage sewer outfall.

END OF SECTION

PART 1 – GENERAL

1.1 Summary

.1 Section includes:

.1 Perimeter weepers.

.2 Geotextile filter cloth.

1.2 Administrative Requirements

.1 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01 33 00.

.2 Material data sheets: Submit manufacturer's Material data sheets for Materials proposed for use in the work of this section.

.3 LEED submittals:

.1 Submit LEED submittals in accordance with Section 01 33 29.

.2 Submit LEED Product documentation, including completed Schedule S1 – Material Information Data Sheet and supporting documentation to verify compliance with LEED objectives and requirements.

1.4 Quality Assurance

.1 Qualifications:

.1 Installers:

.1 Shall have 5 years' experience, minimum, in application of Materials, systems, and assemblies specified.

PART 2 - PRODUCTS

2.1 LEED Requirements

.1 Comply with the requirements of Sections 01 33 29.

.2 Requirements in Section 01 33 29 pertinent to the Work of this section include, but are not limited to, the following:

.3 Waste management and disposal:

.1 Comply with the waste management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 74 19. Comply with the directions of the Contractor's LEED coordinator with regard to waste management and disposal activities.

.4 Construction indoor air quality (IAQ) management:

.1 Comply with the IAQ management plan developed by the Contractor for the Work in accordance with Section 01 33 29 and Section 01 81 19. Comply with the directions of the Contractor's LEED coordinator with regard to IAQ management activities.

2.2 Materials

.1 Drainage aggregate:

.1 Clear 19 mm (3/4") stone.

.2 Clear 9 mm (3/8") pea gravel.

.2 Geotextile filter cloth:

.1 Non-woven geotextile of polypropylene or polyester fibres, or combination of both.

.2 Weight: Minimum 136 g/m2 (4.0 oz/yd2), in accordance with ASTM D5261.

.3 Grab tensile strength: Minimum 445 N (120 Pound Force), in accordance with ASTM D4632/D4632M-15a.

.4 Water flow rate: Minimum 2460 l/min/m2 (60 gpm/ft2), in accordance with ASTM D4491/D4491M-22.

.5 Puncture: Minimum 180 N (41 Pound Force), in accordance with ASTM D4833/D4833M-08(2013)e1.

.6 Apparent Opening Size (AOS): Minimum 0.212 mm (0.008"), in accordance with ASTM D4751-20b.

.7 UV stability: 70% at 500 hours, in accordance with ASTM D4355-14(2018).

.8 Acceptable Materials:

.1 Typar Geotextiles 'Typar 3401'.

.2 Tencate Geosynthetics 'Mirafi 150N'.

.3 Terrafix Geosynthetics Inc. 'Terrafix 270R'.

.3 Drainage weepers and fittings (weepers): 150 mm (6") minimum diameter, flexible high density polyethylene (HDPE), BNQ 3624-115-2016, fully perforated complete with one-piece geotextile filter sock, non-perforated at pass through transfer ports and connections to sump pits, weeper manufacturer's standard connector fittings, caps, and insert couplings.

.1 Acceptable Materials:

.1 Armtec 'Big O Drain Tubing'.

.2 Substitutions: in accordance with Section 01 25 00.

PART 3- EXECUTION

3.1 Geotextile Filter Cloth on Subgrade

.1 Do not cover final prepared subgrade surface until completion of quality control inspection.

.2 Entire subgrade surface shall be covered with geotextile filter cloth membrane.

.3 Install filter cloth in accordance with filter cloth manufacturer's written requirements.

.4 Geotextile filter cloth shall be placed directly on the prepared subgrade, and shall be in complete intimate contact with the prepared surface. Bridging of small hollows will not be permitted.

.5 Place geotextile filter cloth on sloping surfaces in one continuous length.

.6 Overlap filter cloth joints minimum 300 mm (12").

.7 Secure and protect filter cloth against displacement.

.8 Do not permit construction equipment on installed filter cloth.

3.2 Perimeter Weepers

.1 Install weepers to provide positive slope to outlets.

.2 Provide manufactured fittings, including cleanouts, to connect weepers.

.3 Connect weepers to indicated sump or outlet.

.4 After quality control inspection, surround weepers with minimum of 300 mm (12") of drainage aggregate.

.5 Wrap drainage aggregate with geotextile filter cloth. Overlap filter cloth joints minimum 200 mm (8").

.6 Do not cover completed weeper installation until completion of quality control inspection.

3.3 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

END OF SECTION