IDENTIFICATION SYSTEMS

1.1 GENERAL

1.2 Summary

.1 This Section covers the supply and installation of permanent identification nameplates, labels and markers for mechanical and heating, ventilation and air conditioning (HVAC) equipment, pipework, gates, and valves.

.2 Requirements for the supply and installation of permanent identification nameplates, labels and markers for electrical equipment, panels, process equipment, tanks and instruments are specified further in Division 16.

1.3 Standards

.1 CAN/CGSBA 24.3 – Identification of Piping Systems.

.2 CGSB 1-GP-12 – Standard Paint Colours.

.3 Identification standards provided in Schedule 18 Appendix 18D.

1.4 Submittals

.1 Submit product data in accordance with Section 01300.

.2 One hundred-eighty (180) Calendar Days prior to commencing any site commissioning activities submit the following:

.1 A typed copy of Nameplate Schedule 01080-A for mechanical and HVAC equipment, pipework, valves, electrical equipment and panels, and instruments as identified in the equipment list and in the instrument index and all receptacles listed on the circuit breaker panel schedules of Section 16410. Submit separate legend/schedule for each circuit breaker panel. Include panel or motor control centre (MCC) control devices (e.g., signal conditioners, relays, timers) mounted within the enclosures and not listed on the equipment list but identified on motor control schematics and/or instrument loop diagrams. Submit separate legend/schedule for each panel and MCC control device. Identify Nameplate Schedule as "Preliminary".

.2 A Marker/Legend Schedule to be provided for all pipework commodities included in the Final Design.

.3 A typical engraved sample of Type 1, Type 2, Type 3, Type 4 and Type 5 nameplates, including the three (3) specified colours.

.4 Typical pipe marker samples with legend and directional arrow including pictogram as required.

.3 A minimum of forty (40) Business Days prior to equipment checkout completion, submit Nameplate and Marker/Legend Schedules.

2. PRODUCTS

2.1 Performance Criteria

.1 Provide identification markers and nameplates that meet standards in the Technical Requirements.

.2 Install markers as required to mark equipment and items securely and in highly visible locations.

.3 Provide markers that are suitable for the material and the environment such that they last as long as the item they are marking.

.4 Markers shall meet the requirement of Section 01450 for hazardous locations.

2.2 Configuration, Components, and Features

.1 Manufacturer's Nameplates:

.1 Each piece of manufactured equipment to have a metal nameplate, with raised or recessed letters. Mechanically fasten plate to equipment.

.2 Manufacturer's nameplates to indicate manufacturer's name, equipment model, size, serial number, electrical characteristics, and other pertinent information for any other services connections.

.3 Nameplates to be located so that they are easily read. Do not insulate or paint over nameplates.

.4 Include other information as required by the equipment Specifications.

.2 Nameplates:

.1 Provide nameplates with a City standard equipment descriptor for all equipment including electrical and mechanical equipment, process instruments, control valves, electrical panels and receptacles.

.2 Provide nameplates as set out in the Technical Requirements.

.3 Nameplate types for each type of equipment are designated Type 1 (A, B or C), Type 2 (A or B), Type 3, Type 4, and Type 5 in accordance with Appendix 18D.

.3 Equipment Descriptors:

.1 Identify equipment with equipment descriptors as set out in Technical Requirements.

.4 Cables, Conduits, and Conductors:

.1 Provide labels for electric cables, conduits, and conductors.

.2 Refer to Section 16010 for cable, conduit, and conductor identification and labeling.

.5 Piping Identification

.1 Label piping as set out in Technical Requirements.

.2 For above ground pipework and exposed conduit, provide mechanically attached type background colour markers that are easily removable.

.3 For underground pipework and conduit, provide stretchable polyethylene ribbon or detectable ribbon laid a minimum of 150 mm above the buried pipe. All ribbon to be detectable by standard utility location equipment, or additional tracer wire to be required.

.4 In addition to the requirements of Appendix 18D, identify piping with pipe markers and direction arrows at the following locations:

.1 Apply intermittent markings on straight pipe runs, close to all valves, fittings, or junction boxes and adjacent to all changes in direction or where pipes pass through walls or floors.

.2 Adjacent to major valves and where valves are in series at no more than 2 m intervals.

.3 On both sides where piping passes through walls, partitions, and floors.

.4 At point of entry and leaving each pipe chase and/or confined space, and piping accessible at each access opening.

.5 At the beginning and end points of each run; and, at each piece of equipment in each run.

.5 Identification arrows labels and letters to be vinyl cloth or vinyl film with adhesive compatible with the surface temperature.

.6 Identification colour bands for primary and secondary colours to indicate the type and degree of hazard to be applied to overlap a minimum of 150 mm. Bands to be Brady B550 vinyl cloth tape, Brady B946 vinyl tape or approved equivalent, with adhesive compatible with the surface temperature.

.6 Valve and Gate Tags:

.1 Refer to and comply with Appendix 18D.

.2 Provide valve nameplates as set out in Appendix 18D.

.3 Valves to be tagged include:

.1 Valves on all main piping circuits.

.2 Valves on all major branch lines.

.3 Valves on minor branch lines in horizontal service spaces, vertical service spaces and mechanical equipment rooms.

.4 Drain valves and hose bibs on systems containing glycol.

.5 Control valves.

.4 Tag valves on control valve stations, steam trap stations, fixture stops, and system drain valves. If necessary, tag pipe to adjacent item.

.7 Markers:

.1 Provide identification marking material that is appropriate for the environment specified in Section 01450. At a minimum, provide identification marking material which is not degraded by exposure to ultraviolet (UV) radiation, abrasion, moisture, and that does not wrinkle with age or exposure.

.2 Marker/Legend Colour Coding:

Process Commodity	Process Commodity Abbreviation	Background Colour[(a)]	Legend Colour[(a)]
Agitation Air	AA	Orange (508-101)	Black (512-101)
Backwash Air	BA	Orange (508-101)	Black (512-101)
Boiler Chemical Treatment, Low Pressure	BCTL	Yellow (505-101)	Black (512-101)
Boiler Chemical Treatment, Medium Pressure	BCTM	Yellow (505-101)	Black (512-101)
Boiler Blowdown, Low Pressure	BDL	Green (503-107)	White (513-101)
Boiler Blowdown, Low Pressure	BDM	Green (503-107)	White (513-101)
Boiler Feedwater, Low Pressure	BFL	Green (503-107)	White (513-101)
Boiler Feedwater, Low Pressure	BFM	Green (503-107)	White (513-101)
Biofilter Effluent	BFE	Green (503-107)	White (513-101)
Backwash Water	BWW	Green (503-107)	White (513-101)
Potable Water (domestic)	C1	Blue (502-104)	Black (512-101)
Non-potable Water	C2	Green (503-107)	White (513-101)
Plant Effluent Water	C3	Green (503-107)	White (513-101)
Reclaimed Water	C7	Green (503-107)	White (513-101)
Cogeneration Cooling Water	CCW	Green (503-107)	Black (512-101)
Condensate	CDN	Yellow (505-101)	Black (512-101)
Centrate	CEN	Green (503-107)	White (513-101)
Centrifuge Feed	CF	Green (503-107)	White (513-101)
Chlorine Gas	CLG	Yellow (505-101)	Black (512-101)
Chlorine Liquid	CLL	Yellow (505-101)	Black (512-101)
Chlorine Solution	CLS	Yellow (505-101)	Black (512-101)
Chlorine, Vacuum	CLV	Yellow (505-101)	Black (512-101)
Circulating Sludge	CS	Green (503-107)	White (513-101)
Coagulant	COAG	Yellow (505-101)	Black (512-101)
Caustic Soda	CSO	Yellow (505-101)	Black (512-101)
Chlorine Solution Water	CSW	Yellow (505-101)	Black (512-101)
Chemical Vent	CVT	Yellow (505-101)	Black (512-101)
Chilled Water Return	CWR	Green (503-107)	Black (512-101)
Chilled Water Supply	CWS	Green (503-107)	Black (512-101)
Domestic Hot Water Flow	DHF	Blue (502-104)	White (513-101)
Domestic Hot Water Return	DHR	Blue (502-104)	White (513-101)
Drainage	DR	Green (503-107)	White (513-101)

Process Commodity	Process Commodity Abbreviation	Background Colour[(a)]	Legend Colour[(a)]
Digested Sludge	DS	Green (503-107)	White (513-101)
Diesel Fuel, Return	DSFR	Yellow (505-101)	Black (512-101)
Diesel Fuel, Supply	DSFS	Yellow (505-101)	Black (512-101)
Dewatered Sludge	DWS	Green (503-107)	White (513-101)
Engine Exhaust	EE	Yellow (505-101)	Black (512-101)
Equalized Sludge	ES	Green (503-107)	White (513-101)
Ferric Chloride	FC	Yellow (505-101)	Black (512-101)
Foul Air	FOA	Yellow (505-101)	Black (512-101)
Fire Protection Supply	FPS	Red (509-102)	White (513-101)
Flotation Sludge	FS	Green (503-107)	White (513-101)
Final Effluent	FE	Green (503-107)	White (513-101)
Natural Gas Supply (Off-Site)	G	Yellow (505-101)	Black (512-101)
Sludge Gas, for Circulation	GC	Yellow (505-101)	Black (512-101)
Glycol Return	GLR	Yellow (505-101)	Black (512-101)
Glycol Supply	GLS	Yellow (505-101)	Black (512-101)
Degritter Overflow	GO	Green (503-107)	White (513-101)
Grit	GR	Green (503-107)	White (513-101)
Ground Water Relief	GWR	Green (503-107)	White (513-101)
Hydraulic Fluid	HF	Yellow (505-101)	Black (512-101)
Heat Reservoir Return	HRR	Green (503-107)	White (513-101)
Heat Reservoir Supply	HRS	Green (503-107)	White (513-101)
High Pressure Sludge Gas	HSG	Green (503-107)	White (513-101)
Instrument Air	IA	Orange (508-101)	Black (512-101)
Lube Oil Return	LOR	Yellow (505-101)	Black (512-101)
Lube Oil Supply	LOS	Yellow (505-101)	Black (512-101)
Lube Oil Water	LOW	Green (503-107)	Black (512-101)
Low Pressure Sludge Gas	LSG	Yellow (505-101)	Black (512-101)
Mixed Gas	MG	Yellow (505-101)	Black (512-101)
Mixed Liquor	ML	Green (503-107)	White (513-101)
Mixed Sludge	MS	Green (503-107)	White (513-101)
Medium Pressure Sludge Gas	MSG	Yellow (505-101)	Black (512-101)
Natural Gas	NG	Yellow (505-101)	Black (512-101)
Overflow	OF	Green (503-107)	White (513-101)
Process Air	PA	Orange (508-101)	Black (512-101)
Primary Effluent	PE	Green (503-107)	White (513-101)
Primary Influent	PI	Green (503-107)	White (513-101)
Polyelectrolyte	POL	Yellow (505-101)	Black (512-101)
Primary Sludge	PS	Green (503-107)	White (513-101)
Pressurized Supernatant	PSU	Green (503-107)	White (513-101)
Process Waste Drainage	PWD	Green (503-107)	White (513-101)
Primary Scum	PY	Green (503-107)	White (513-101)
Refrigerant Hot Gas Bypass	RFH	Yellow (505-101)	Black (512-101)
Refrigerant Liquid	RFL	Yellow (505-101)	Black (512-101)
Refrigerant Suction	RFS	Yellow (505-101)	Black (512-101)
Raw Sewage	RS	Green (503-107)	White (513-101)
Return Secondary Sludge	RSS	Green (503-107)	White (513-101)
Rain Water, Leader	RWL	Green (503-107)	White (513-101)

Process Commodity	Process Commodity Abbreviation	Background Colour[(a)]	Legend Colour[(a)]
Service Air	SA	Orange (508-101)	Black (512-101)
Sanitary Drainage	SAN	Green (503-107)	White (513-101)
Screenings	SC	Green (503-107)	White (513-101)
Sludge Cooling Water	SCW	Green (503-107)	Black (512-101)
Sulphur Dioxide Gas	SDG	Yellow (505-101)	Black (512-101)
Sulphur Dioxide Liquid	SDL	Yellow (505-101)	Black (512-101)
Sulphur Dioxide Solution	SDS	Yellow (505-101)	Black (512-101)
Sulphur Dioxide Vacuum	SDV	Yellow (505-101)	Black (512-101)
Secondary Effluent	SE	Green (503-107)	White (513-101)
Septage	SEP	Green (503-107)	White (513-101)
Sodium Hypochlorite Solution	SHS	Yellow (505-101)	Black (512-101)
Screened Primary Scum	SPY	Green (503-107)	White (513-101)
Starting Air	STA	Orange (508-101)	Black (512-101)
Steam, Low Pressure	STML	Yellow (505-101)	Black (512-101)
Steam, Medium Pressure	STMM	Yellow (505-101)	Black (512-101)
Stormwater Drainage	STW	Green (503-107)	White (513-101)
Supernatant	SU	Green (503-107)	White (513-101)
Seal Water	SW	Green (503-107)	White (513-101)
Secondary Scum	SY	Green (503-107)	White (513-101)
Tank Drainage	TD	Green (503-107)	White (513-101)
Thickener Bottom Sludge	TBS	Green (503-107)	White (513-101)
Thickener Overflow	TOF	Green (503-107)	White (513-101)
Thickened Primary Sludge	TPS	Green (503-107)	White (513-101)
Thickened Scum	TPY	Green (503-107)	White (513-101)
Thickened Screened Primary Sludge	TSPS	Green (503-107)	White (513-101)
Thickened Screened Primary Scum	TSPY	Green (503-107)	White (513-101)
Thickener Underflow	TUF	Green (503-107)	White (513-101)
Thickened Waste Secondary Sludge	TWSS	Green (503-107)	White (513-101)
Vent, Process	V	Green (503-107)	White (513-101)
Vacuum	VA	Green (503-107)	White (513-101)
Vent, Sanitary	VS	Green (503-107)	White (513-101)
Municipal Water Supply	W	Blue (502-104)	Black (512-101)
Waste Secondary Sludge	WSS	Green (503-107)	White (513-101)

Note: (a) See CGSB 1-GP-12 Standard Paint Colour.

.8 For commodities not listed, submit recommendation for review:

.1 Comply with CGSB 1-GP-12 Standard Paint Colours.

.2 Legend:

.1 Identify material contained in a piping system by a legend made up of clearly legible letters and/or numbers giving the name or identifier of the material. Place legend on background colour marker in accordance with colour coding.

.2 Identify piping systems containing materials at temperatures greater than 40°C showing maximum temperature in °C.

.3 Identify piping systems containing materials at pressures greater than 100 kPa showing maximum pressure in kPa units.

.4 Label electrical conduits indicated in the Technical Requirements.

.5 Provide direction arrows for flow; double arrows for reversible flow. Arrow colour code is the same as legend colour code.

.6 Lettering sizing:

Pipe or Covering Outer Diameter, mm	Legend Size, mm
19 < OD ≤ 32	13
32 < OD ≤ 51	19
51 < OD ≤ 153	32
153 < OD ≤ 255	64
OD > 255	89

.7 For pipes less than 19 mm diameter, use tags or wall markings with legend size of 13 mm.

.9 Pictograms:

.1 Identify controlled substances contained in a piping system using pictogram(s) applied onto background colour markers. Use Workplace Hazardous Materials Information System (WHMIS) symbols for pictograms.

.2 Minimum diameter of pictogram: 13 mm.

.3 Apply pictograms adjacent to legend and arrow.

.4 Pictogram colours:

Material	Pictogram Colours[(a)]
Hazardous	Black (512-101) on Yellow (515-101)
Inherently Low Hazard	Not applicable
Fire Protection	White (513-101) on Red (509-102)

Note: (a) See CGSB 1-GP-12 Standard Paint Colour.

.10 Visibility:

.1 Place identification on the bottom of the piping system for pipe systems located near ceiling or above the normal line of sight.

.2 Place identification on the side of the piping systems for pipe systems located at the normal line of sight or below.

.3 Place identification approximately at person's line of sight for vertical pipe systems.

3. EXECUTION

3.1 General

.1 Install in accordance with Manufacturer's recommendations and as required by the Final Design.

.2 Undertake commissioning phases as specified in the Technical Requirements.

.3 Affix nameplates to an area of the piece of equipment that would remain fixed if the piece of equipment is removed for maintenance. Examples:

.1 Mount the nameplates for pumps and motors on the base plate.

.2 Hang the nameplate for an inline pump by a nylon tie near the electrical connection at the pump.

.4 Affix nameplates for electrical equipment housed in metal cabinets in a highly visible area, horizontally centered in the upper region of the cabinet or door of the cabinet.

END OF SECTION

SUBMITTALS

1. GENERAL

1.1 Summary

.1 Submit shop drawings for review by the designer

.2 Provide reviewed shop drawings for informational review by the City a minimum of 7 days prior to installation.

.3 Do not proceed with Work affected by submittal until review is complete by the designer.

.4 Present Shop Drawings, product data, samples in SI Metric units.

.5 Where items or information is not produced in SI Metric units converted units are acceptable.

.6 Submittals shall be stamped, signed, dated and identified as to which component of the project they will be used.

.7 Designers to notify the City in writing at time of submission, identifying any deviations from the Final Design.

.8 Verify field measurements and affected adjacent Work are co-ordinated.

.9 Provide reports and test data required in the specifications.

1.2 Shop Drawings and Product Data

.1 Provide submittals in accordance with Section 01300 in addition to the following items:

.2 Extended warranty documentation where required.

.3 Design Builder shall provide Shop Drawings for all supplied equipment.

.4 The term "Shop Drawings" means drawings, diagrams, model of equipment, nameplate information, size, weight, dimensions, illustrations, schedules, performance charts, brochures, reports, certified copies of factory testing data including calibration on test equipment, test data required by the specifications and design calculations.

.5 Design Builder shall provide to the City for review, all documents, reports, plans, drawings, specifications, design calculations, data, certificates, samples, shop drawings, mock-ups, logs, tests, methods, schedules, catalogue cuts and manufacturer's installation and other instructions, guides and manuals as required by the Technical Requirements and as required by the City to fully demonstrate that the design and construction complies with the Technical Requirements.

.6 Shop Drawings are to clearly indicate bill of materials, name plates, colour, tag numbers, model numbers, methods of construction, erection diagrams, connections, explanatory notes, and other information necessary for completion of the Work.

.7 Shop Drawings shall include operation and maintenance information including, trouble shooting guides, spare part requirements, recommended lubricants and maintenance schedule, and explanatory notes that will impact the operation of the equipment.

.8 Provide hydraulic calculations for all water controlling equipment and manufacturers certification in accordance with the Hydraulic Institute.

.9 Bearing life and design data, certified by equipment manufacturer. Provide bearing temperature operating range for the service conditions specified.

.10 All quality assurance and quality control procedures, records, certifications, standard forms, samples, testing results, reports, and personnel and firm qualifications and references.

.11 Provide a list of recommended materials for the specified service. Provide documentation showing material compatibility with process fluid and service specified.

.12 Completed Factory Acceptance Testing, modeling work, installation, performance and commissioning testing and inspection forms.

.13 Shop Drawings shall also clearly indicate internal and external electrical interconnection details, HMI screens, required insulation conduit and connection details, grounding requirements, control schematics, motor characteristics, electrical enclosure types, rotational direction, motor efficiency, cable entry, programming.

.14 Where articles or equipment attach or connect to other articles or equipment, clearly indicate that all such attachments and connections have been properly coordinated, regardless of the trade under which the adjacent articles or equipment will be supplied and installed. Shop Drawings must be submitted with the appropriate Specification Sections attached. Notify the Engineer in writing of any deviations in Shop Drawings from the Technical Requirements.

.15 Examine all Shop Drawings prior to submission for review by the designer to ensure that all necessary requirements have been determined and verified and that each Shop Drawing has been checked and coordinated with the requirements of the Work and the Technical Requirements. Prior to submission, examination of each Shop Drawing shall be completed by the designer. The designer shall indicate this examination has been completed by stamp, date and signature of the Shop Drawing. Shop Drawings not stamped, signed and dated will be considered incomplete.

.16 Provide reviewed Shop Drawings with reasonable promptness and in an orderly sequence such that they are provided to the City a minimum of 7 days prior to installation.

.17 Any general review by the City, if provided, is only for information purposes and shall not relieve Design Builder of its responsibility for errors or omissions in Shop Drawings or for proper completion of the Work in accordance with the Technical Requirements.

.18 Responsibility for verification and correlation of field dimensions, fabrication processes, techniques of construction, installation and coordination of all parts of the Work rests with the designer.

1.3 Submittals

.1 Shop Drawings will be reviewed by the designer and only the completely reviewed Shop Drawings shall be provided:

.2 Shop Drawings indicating design requirements require the seal of a qualified Professional Engineer, registered in the province of Manitoba.

.3 Submit Shop Drawings electronically via Design Builder's Document Management System. Make sure all submissions are clear and readable.

.4 Remove information not applicable to the Works in the Shop Drawing.

.5 Any review of Shop Drawings by the City is for sole purpose of ascertaining conformance with general concept.

.1 A review shall not mean that the City approves detail design inherent in Shop Drawings, responsibility for which shall remain with Design Builder, and such review shall not relieve Design Builder of responsibility for errors or omissions in Shop Drawings or of responsibility for meeting the Technical Requirements.

.2 Without restricting generality of foregoing, the designers are responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation.

.6 Identify location where item is to be installed.

.7 Vibration testing plans including test equipment, calibration, certificates, location of transducers, operating speed and operating parameters showing machine load.

1.4 Samples

.1 Submit for review samples in duplicate as requested in respective specification Sections to the designer. Label samples with origin and intended use. Provide access to samples for City upon request.

.2 Provide a general colour scheme to be followed, complete with colour samples.

.3 Reviewed and accepted samples by the designer will become standard of workmanship and material against which installed Work will be verified.

1.5 Photographic Documentation

.1 Submit electronic copy of colour digital photography in jpg format, standard resolution, with monthly report.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints: Sufficient to show entire project site.

.4 Frequency of photographic documentation: daily.

1.6 Transmittal Procedure

.1 Accompany submissions with transmittal letter containing:

.1 Date.

.2 Project title and work component.

.3 Name of approving engineer.

.4 Name of supplier and manufacturer.

.5 Construction Contractor's name and address.

.6 Provide copy of specification that describes the product where applicable.

.7 Identification and quantity of each Shop Drawing, product data and sample.

.8 Other pertinent data necessary for Engineer’s review.

.2 Use a separate form for each specific item, class of material, equipment, and items specified in separate, discrete sections, for which the submittal is required. Identify Construction Contract Document, equipment numbers, equipment descriptors, Drawing numbers, and Specification Sections for each submittal and item in each submittal.

.3 Identify submittal documents common to more than one piece of equipment with all the appropriate equipment numbers.

.4 Use a single form for submittals for various items when the items taken together constitute a Manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole.

2. PRODUCTS (NOT USED)

3. EXECUTION

.1 Provide all mounting details including: anchor details, equipment pads, baseplates, steel frame details, expansion joint locations, group type and placement details.

.2 For valves and gates, provide calculation of breakaway lift and thrust forces, stress and gates and defection under design head, shaft deflection, leakage calculations, and integration details with actuators.

.3 For all pumps provide operating data for pump curves anticipated shaft deflection, service life, operating temperatures, alignment tolerances, NPSH requiring efficiency and discharge characteristics, details of impellors, solid sphere passing capacity, seal details, lubrication requirements and critical speed analysis as required.

.4 For mixing systems, provide all calculations of energy gradient pertinent details illustrating the ability to maintain homogeneity power requirements, and characteristics of induced flow and self-cleaning characteristics.

.5 For blowers provide all operating data for blower curves including humidity, pressures, operating temperatures, air filter requirements, sensors, silencers, noise levels, pressure relief settings, capacity, inlet pressure requirements, installation tolerances and efficiency.

.6 For electrical components provide electrical rating, panel layouts, enclosure types, wiring diagrams for internal and external areas, inter connection diagrams, control schematics, overloads, cooling requirements, mounting methods, rotational direction,

END OF SECTION

AREA EXPOSURE DESIGNATIONS

1. GENERAL

1.1 Summary

.1 This Section covers area exposures designations for each location, room, area, or space at the Facility.

.2 Use area exposures to specify materials of construction based on the corrosive environment in each space of the Facility.

.3 Designate areas for electrical equipment in accordance with Division 16.

1.2 Definitions

.1 Exposure terminology used in this Section conforms to the definitions following this paragraph. Exposures are listed in order of least to most severe corrosion potential.

.1 Indoor Dry: locations inside a building or other enclosed structure not subjected to wash down and not in contact with a liquid holding or earth retaining wall.

.2 Indoor Wet: locations inside a building or structure that are damp or subject to wash down, or surfaces of structures that are in contact with a liquid holding or earth retaining wall or slab.

.3 Outdoor: unenclosed locations that are not protected from the weather. Design Builder shall familiarize itself with local weather conditions (temperatures, relative humidity and precipitation).

.4 Buried: below grade walls or roofs; locations covered and in contact with earth/soil.

.5 Submerged: locations inside a covered liquid or solids holding structure that are below a plane located 300 mm below the minimum operating level and locations inside an open liquid or solids holding structure that are below the top of wall.

.6 Process Corrosive: locations exposed to high humidity, frequent wash down and/or dilute corrosive gases from the process stream.

.7 Head Space: locations inside a covered liquid or solids holding structure that are above a plane located 300 mm below the minimum operating level.

.8 Chemical Corrosive: walls, ceilings, floors, trenches and other surfaces exposed to delivery, storage, transfer, use or containment of corrosive chemicals.

.2 Environmental Conditions: environmental conditions for each exposure are tabulated below:

	Exposure	Environment	Chemical Exposure	Chemical Concentration
(1)	Indoor Dry	Atmospheric, Dry	None	Not Applicable
(2)	Indoor Wet	Atmospheric, Wet	None	Not Applicable
(3)	Outdoor	Atmospheric, Wet	None	Not Applicable
(4)	Buried	Solution	Earth/Soil	Not Applicable

	Exposure	Environment	Chemical Exposure	Chemical Concentration
(5)	Submerged	Solution	Various Chemicals	Dilute
(6)	Process Corrosive	Atmospheric, Wet	Hydrogen Sulfide Chlorine Trace Chemicals	>1 parts per million Dilute Dilute
(7)	Head Space	Atmospheric, Wet	Hydrogen Sulfide Other trace gases	>10 parts per million Dilute
(8)	Chemical Corrosive	Solution	Chlorine Polyelectrolyte Sodium Hypochlorite Sodium Hydroxide	To be determined To be determined To be determined To be determined

1.3 Submittals

.1 Submit product data in accordance with Section 01300.

.1 Manufacturer's descriptive literature for materials.

1.4 Area Exposure Table

.1 Identify the exposure area for each location, room, area, or space at the Facility and provide an Exposure Table.

2. PRODUCTS

2.1 Material Selection

.1 Provide construction materials, coating systems, and lining systems consistent with materials requirements specified in individual equipment/material specifications for the exposure assigned in the area exposure table. In the event an area exposure is not designated for a particular location, the area exposure with the most severe corrosion potential from all area exposures for adjacent locations, rooms, areas, or spaces governs.

.2 Where components are assigned multiple area exposures, select the material and coating specified for the area exposure that has the most severe corrosion potential. When components cross, span, or straddle the boundary separating two (2) or more area exposures, select materials specified for the area exposure that has the most severe corrosion potential and is suitable for each area exposure. Where materials change at a boundary between exposures, change the material at the boundary or within the less severe exposure. At material transitions, separate dissimilar metals by a dielectric coupling or other method to eliminate corrosion potential.

3. EXECUTION (NOT USED)

END OF SECTION

PROJECT IDENTIFICATION AND SIGNS

1. GENERAL

1.1 Summary

.1 This Section covers requirements for identification signs for the Project during construction.

1.2 Submittals

.1 Submit a layout sketch of the construction sign with lettering sizes, spacing, and supporting details specified in this section. Identify proposed location(s) for sign installation.

.2 Submit product data in accordance with Section 01300.

.1 Manufacturer's descriptive literature for materials.

2. PRODUCTS

2.1 Performance Criteria

.1 Provide and erect prior to mobilization a two-part Project sign. Support the sign on two (2) 200 mm by 200 mm treated timber posts.

.2 The top sign to be 900 mm by 2400 mm of wood frame and plywood construction with edging, painted with an exterior enamel with exhibit lettering and produced by a professional sign painter. Indicate on the sign the names and logos of the organizations as specified in the Technical Requirements.

.3 The bottom sign to be 900 mm by 2400 mm of wood frame and plywood construction with edging, painted with exhibit lettering of the same style and quality as the top sign. Indicate on the sign the name of the Project, Design Builder’s name, and major subcontractors.

.4 Erect the sign allowing 2000 mm clearance from the lowest sign to the ground.

3. EXECUTION

3.1 General

.1 Install in accordance with Manufacturer’s recommendations and as required by the Final Design.

.2 Undertake commissioning phases as specified in the Technical Requirements.

.3 Maintain sign in good condition for the duration of the Project. Clean periodically.

.4 No other signs or advertisements, other than warning signs, are permitted on site.

.5 Remove construction sign and restore site to clean condition within ten (10) Business Days after the completion of the Operational Advisory Period.

END OF SECTION

FINAL CLEANING

1. GENERAL

1.1 Summary

.1 This Section covers the final site cleaning requirements for the Works.

.2 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

1.2 Final Cleaning

.1 In preparation for Substantial Completion of the Project, perform final cleaning.

.2 All electrical and control panels to be free of debris and vacuumed out.

.3 All concrete surfaces to be free of oil, excess concrete/grout material and other dirt.

.4 All drainage systems (floor, curb, gutter, storm or otherwise) to be clean and free of debris.

.5 Leave watercourses, gutters, and ditches open and clean.

.6 All wrapping, packaging, crating to be removed.

.7 Site to be free of any excess building materials or garbage.

.8 Broom clean paved surfaces; rake clean other ground surfaces.

.9 Wipe down/vacuum all equipment.

.10 All empty channels, tanks, and sumps to be free of debris and broom cleaned.

.11 Remove any temporary facilities or services not required by City for future use or required by Design Builder to carry out performance period services.

.12 Replace all ventilation filters.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

RESTORATION OF IMPROVEMENTS

1. GENERAL

1.1 Summary

.1 This Section covers the requirements for restoration of existing structures, utilities and City facilities impacted during execution of the Project.

1.2 Definitions

.1 Structures and utilities: All types of existing, relocated, and new features within or outside the site including but not limited to City property, non-City property, public roadways, equipment, utilities, chases, buildings, tunnels, landscaping, architectural features, concrete work, channels, piping, duct, foundations of all types, piers of all types, roadway embankments, pumping stations, and bridge structures.

2. PRODUCT

2.1 Performance Criteria

.1 Take all precautions necessary to protect the integrity and usefulness of existing facilities, structures and utilities.

.2 If necessary to complete the Works, remove existing structures, including curbs, gutters, pipelines, and utility poles. Rebuild the structures and utilities thus removed to the condition as found or better.

.3 Repair existing structures and utilities which may be damaged as a result of construction of the Facility. Restore to equal or better condition.

2.2 Roads Streets and Walkways

.1 Unless otherwise specified, re-surface and bring to the original grade and section roads, streets, and walkways in which the surface is removed, broken, or damaged, or in which the ground has caved or settled during the completion of the Project.

.2 Trim back edges of pavement far enough to provide clean, solid, vertical faces and keep free of loose materials before resurfacing material is placed.

.3 Cut all paved surfaces with a pavement saw.

.4 Conform to the paving requirements in accordance with Section 02741.

2.3 Surface Improvements

.1 Protect and replace existing guard posts, barricades, light posts, signs, and fences if damaged. Restore to equal or better condition.

2.4 Other Restoration

.1 Re-finish surfaces to provide an even finish. Refinish continuous surfaces to the nearest intersection. Re-finish entire assemblies. Finish restored surfaces to such planes, shapes,

and textures that no transition between existing work and new works is evident in finished surfaces.

.2 Restore existing underground structures and utilities that are to remain part of the Facility including but not limited to concrete-embedded piping, conduits, and other utilities.

.3 Make restorations with new materials and appropriate methods as specified for new works of similar nature to the existing work; if not specified, use the more stringent of recommended practice of manufacturer or Good Industry Practice.

3. EXECUTION (NOT USED)

END OF SECTION