

**Part 1            General**

**1.1                WORK COVERED BY CONTRACT DOCUMENTS**

- .1            Work of this Contract comprises general construction for the installation of exterior concrete slabs for future mechanical equipment at the Hurst Regional Pump Station (RPS) and MacLean RPS.

**1.2                CONTRACT METHOD**

- .1            Construct Work under stipulated price contract.

**1.3                SUBMITTALS**

- .1            Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2            Submit Project construction progress schedule in accordance with Supplemental Conditions.
- .3            Submit site-specific Safe Work Plan in accordance with the Supplement Conditions and Section 01 35 29.06 - Health and Safety Requirements.

**1.4                WORK BY OTHERS**

- .1            Co-operate with other Contractors in carrying out their respective works and carry out instructions from the Contract Administrator.
- .2            Co-ordinate work with other contractors. If any part of work under this Contract depends for its proper execution or result upon work of another contractor, report promptly to the Contract Administrator, in writing, any defects which may interfere with proper execution of Work.

**1.5                WORK SEQUENCE**

- .1            Construct Work in stages to accommodate the City's continued use of premises during construction.
- .2            Co-ordinate Progress Schedule and co-ordinate with City Occupancy during construction.
- .3            Maintain City operational access and fire access/control.
- .4            Protect workers and public safety.

**1.6                CONTRACTOR USE OF PREMISES**

- .1            All access shall be arranged through the City.
- .2            Limit use of premises for Work, for storage, and for access, to allow:
  - .1            City occupancy.
  - .2            Work by other contractors.
- .3            Co-ordinate use of premises under direction of the Contract Administrator.
- .4            Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .5            Refer to Section 01 56 00 - Temporary Barriers and Enclosures, for temporary facilities, access roads and parking areas, traffic regulations, and utilities.

- .6 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .7 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by the City and/or Contract Administrator.
- .8 Ensure that operating conditions of existing work at completion are still the same, equal to, or better than that which existed before new work started.
- .9 Smoking and the use of E-cigarettes on the Site is only permitted in designated areas.

#### **1.7 OWNER OCCUPANCY**

- .1 The City will occupy premises during entire construction period for execution of normal operations.
- .2 Co-operate with the City in scheduling operations to minimize conflict and to facilitate City usage.

#### **1.8 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING**

- .1 Execute work with least possible interference or disturbance to building operations occupants, and normal use of premises. Arrange with the Contract Administrator to facilitate execution of work.

#### **1.9 EXISTING SERVICES**

- .1 Notify the City, Contract Administrator, and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give the City and Contract Administrator five Working Days' notice for necessary interruption of mechanical, controls or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian, vehicular traffic, and tenant operations.
  - .1 Submit a shutdown plan in accordance with Section 01 33 00 – Submittal Procedures for service disruptions. The shutdown plan shall include the following:
    - .1 City staff resources required.
    - .2 start and end time of the shutdown.
    - .3 show the temporary services that will be provided if required to maintain the Site's operation.
    - .4 the procedures and staging of the system shutdowns and re-activations.
    - .5 anticipated impacts to services as a result of the shutdown.
    - .6 time required to bring systems back online.
    - .7 systems to be isolated and locked out, tagged out (LOTO); and
    - .8 backout plan if work is not successful or will extend beyond the time limits.
  - .2 The work associated with the shutdown shall not commence until the shutdown plan has been coordinated with the City and approved by the Contract Administrator.
- .3 Provide alternative routes for personnel, pedestrian, and vehicular traffic.

- .4 Establish location and extent of service lines in area of work before starting Work in accordance with the shutdown plan. Notify the City and Contract Administrator of findings.
- .5 Submit schedule in accordance with the shutdown plan for approval by the City and Contract Administrator for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .6 Provide temporary services in accordance with the shutdown plan when directed by the City to maintain critical building and tenant services.
- .7 Where unknown services are encountered, immediately advise the City and Contract Administrator, and confirm findings in writing.
- .8 Protect, relocate, or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .9 Record locations of maintained re-routed, and abandoned service lines.
- .10 Construct barriers, as required, in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

**1.10 DOCUMENTS REQUIRED**

- .1 Maintain at job site, one copy of each document as follows:
  - .1 The Tender Document.
  - .2 Contract Drawings.
  - .3 Specifications.
  - .4 Addenda.
  - .5 Reviewed Shop Drawings.
  - .6 List of Outstanding Shop Drawings.
  - .7 Requests for Information.
  - .8 Field Instructions.
  - .9 Proposed Change Notices.
  - .10 Change Orders.
  - .11 Other Modifications to Contract.
  - .12 Field Test Report, Commissioning Verification Testing and Verification Documentation such as Forms and Check Sheets and Commissioning Issues/Resolution Log.
  - .13 Copy of Approved Current Work Schedule showing the current status/completion of each task.
  - .14 Safe Work Plan and Other Safety Related Documents; and
  - .15 Other documents as specified.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

.1 Not used.

**END OF SECTION**

## **1. GENERAL**

### **1.1 ADMINISTRATIVE**

- .1 Submit to Contract Administrator submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples, and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Contract Administrator. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Contract Administrator, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Contract Administrator's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator review.
- .10 Keep one reviewed copy of each submission on site.

### **1.2 Shop Drawings and Product Data**

- .1 Where requested, submit drawings stamped and signed by professional engineer registered or licensed in Manitoba, Canada.
- .2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes, and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to Contract Drawings and Specifications.
- .3 Allow 10 Business Days for Contract Administrator's review of each submission.
- .4 Adjustments made on Shop Drawings by Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.

- .5 Make changes in Shop Drawings as Contract Administrator may require, consistent with Contract Documents. When resubmitting, notify Contract Administrator in writing of revisions other than those requested.
- .6 Accompany submissions with transmittal letter containing:
  - .1 Date.
  - .2 City Tender title and Tender number.
  - .3 Contractor's name and address.
  - .4 Identification and quantity of each Shop Drawing, product data and sample.
  - .5 Other pertinent data.
- .7 Submissions include:
  - .1 Date and revision dates.
  - .2 City Tender title and Tender number.
  - .3 Name and address of:
    - .1 Subcontractor.
    - .2 Supplier.
    - .3 Manufacturer.
  - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
  - .5 Details of appropriate portions of Work as applicable:
    - .1 Fabrication.
    - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
    - .3 Setting or erection details.
    - .4 Capacities.
    - .5 Performance characteristics.
    - .6 Standards.
    - .7 Operating weight.
    - .8 Wiring diagrams.
    - .9 Single line and schematic diagrams.

- .10 Relationship to adjacent work.
- .8 After Contract Administrator 's review, distribute copies.
- .9 Submit electronic copies of Shop Drawings for each requirement requested in specification Sections and as Contract Administrator may reasonably request.
- .10 Submit electronic copies of product data sheets or brochures for requirements requested in Specification sections and as requested by Contract Administrator where Shop Drawings will not be prepared due to standardized manufacture of product.
- .11 Submit electronic copies of test reports for requirements requested in Specification sections and as requested by Contract Administrator.
  - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
  - .2 Testing must have been within 3 years of date of contract award for project.
- .12 Submit electronic copies of certificates for requirements requested in Specification sections and as requested by Contract Administrator.
  - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
  - .2 Certificates must be dated after award of project contract complete with project name.
- .13 Submit electronic copies of manufacturer's instructions for requirements requested in Specification sections and as requested by Contract Administrator.
  - .1 Pre-printed material describing installation of product, system, or material, including special notices and Safety Data Sheets concerning impedances, hazards and safety precautions.
- .14 Submit electronic copies of Manufacturer's field reports for requirements requested in Specification sections and as requested by Contract Administrator.
- .15 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .16 Submit PDF electronic copy of Operation and Maintenance Data for requirements requested in Specification sections and as requested by Contract Administrator.
- .17 Delete information not applicable to project.
- .18 Supplement standard information to provide details applicable to project.
- .19 If upon review by Contract Administrator, no errors or omissions are discovered or if only minor corrections are made, electronic copy will be returned, and fabrication and installation of Work may proceed. If Shop Drawings are rejected, noted copy will be returned and resubmission of corrected Shop Drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

- .20 The review of Shop Drawings by the Contract Administrator is for the sole purpose of ascertaining conformance with the general design concept.
  - .1 This review shall not mean that Contract Administrator approves detail design inherent in Shop Drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in Shop Drawings or of responsibility for meeting requirements of the Contract Documents.
  - .2 Without restricting generality of foregoing, Contractor is 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 and for co-ordination of Work of sub-trades.

### **1.3 SAMPLES**

- .1 Submit for review samples in duplicate as requested in respective Specification sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Contract Administrator's business address.
- .3 Notify Contract Administrator in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.
- .6 Make changes in samples which Contract Administrator may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

### **1.4 PHOTOGRAPHIC DOCUMENTATION**

- .1 In addition to the photographs taken by the Contract Administrator's Resident Engineer submit electronic copy of colour digital photography in jpg format, standard resolution as directed by Contract Administrator.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints:
  - .1 Viewpoints and their location as determined by the Contract Administrator.
- .4 Frequency of photographic documentation: as directed by the Contract Administrator.



**2. PRODUCTS**

**2.1 NOT USED**

.1 Not Used.

**3. EXECUTION**

**3.1 NOT USED**

.1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCE STANDARDS**

- .1        Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2        Province of Manitoba
  - .1        The Workers Compensation Act RSM 1987 - Updated 2021.

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2        Submit site-specific Safe Work Plan in accordance with the Supplemental Conditions.
- .3        Include results of Site-specific safety hazard assessment.
- .4        Include results of safety and health risk or hazard analysis for Site tasks and operation found in work plan.
- .5        Submit electronic copies of Contractor's authorized representative's work site health and safety inspection reports to Contract Administrator and/or authority having jurisdiction, daily, or at specified intervals by the Contract Administrator.
- .6        Submit copies of reports or directions issued by Federal, Provincial health and safety inspectors.
- .7        Submit copies of incident and accident reports.
- .8        Submit WHMIS Safety Data Sheets (SDS) in accordance with Section 02 81 00 - Hazardous Materials.
- .9        Contract Administrator will review Contractor's site-specific Safe Work Plan and provide comments to Contractor within 10 Business Days after receipt of plan. Revise plan as appropriate and resubmit plan to Contract Administrator within 10 Business Days after receipt of comments from Contract Administrator.
- .10       Contract Administrator's review of Contractor's final Safe Work Plan shall not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .11       Medical Surveillance: where prescribed by legislation, regulation, or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Contract Administrator.
- .12       On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
  - .1        Note the Sites have chemical dosing processes that may release to the environment under unusual and extraordinary circumstances. The City will review with the Contractor the appropriate Safe Work Procedures for the incorporation into the document.

**1.3                FILING OF NOTICE**

- .1        File Notice of Project with Provincial authorities prior to beginning of Work as required.

**1.4 SAFETY ASSESSMENT**

- .1 Perform site specific safety hazard assessment related to project.

**1.5 MEETINGS**

- .1 Schedule and administer Health and Safety meeting with Contract Administrator prior to commencement of Work.

**1.6 REGULATORY REQUIREMENTS**

- .1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements.

**1.7 PROJECT/SITE CONDITIONS**

- .1 Hazards at the Site involve:
  - .1 Working at a Site which uses chemicals for disinfection of the treated water leaving the RPS. The chemical can pose as an immediate hazard to life and health.

**1.8 GENERAL REQUIREMENTS**

- .1 Develop written site-specific Safe Work Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from Site.
- .2 Contract Administrator may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

**1.9 RESPONSIBILITY**

- .1 Be responsible for health and safety of persons on the Sites, safety of property on Sites and for protection of persons adjacent to the Sites and environment to extent that they may be affected by conduct of the Work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial, and local statutes, regulations, and ordinances, and with site-specific Safe Work Plan.

**1.10 COMPLIANCE REQUIREMENTS**

- .1 Comply with The Workers Compensation Act, Workplace Safety Regulation, Manitoba Reg. C.C.S.M c. W210.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

**1.11 UNFORSEEN HAZARDS**

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Manitoba having jurisdiction and advise Contract Administrator verbally and in writing.

**1.12 HEALTH AND SAFETY CO-ORDINATOR**

- .1 Employ and assign to Work, competent, and authorized representative as Health and Safety Co-ordinator.
- .2 Health and Safety Co-ordinator must:
  - .1 Have site-related working experience specific to activities.

- .2 Have working knowledge of occupational safety and health regulations.
- .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
- .4 Be responsible for implementing, enforcing daily, and monitoring site-specific Contractor's Safe Work Plan; and
- .5 Be on site during execution of Work and report directly to and be under direction of Site supervisor.

**1.13 POSTING OF DOCUMENTS**

- .1 Ensure applicable items, articles, notices, and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Manitoba having jurisdiction, and in consultation with Contract Administrator.

**1.14 CORRECTION OF NON-COMPLIANCE**

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction, Contract Administrator, or the City.
- .2 Provide Contract Administrator with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Contract Administrator may stop Work if non-compliance of health and safety regulations is not corrected.

**1.15 BLASTING**

- .1 Blasting or other use of explosives is not permitted.

**1.16 POWDER ACTUATED DEVICES**

- .1 Use powder actuated devices only after receipt of written permission from Contract Administrator.

**1.17 WORK STOPPAGE**

- .1 Give precedence to safety and health of public and Site personnel and protection of environment over cost and schedule considerations for Work.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1            General**

**1.1            DEFINITIONS**

- .1    Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
- .2    Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

**1.2            ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2    Product Data:
  - .1    Submit WHMIS Safety Data Sheets (SDS) in accordance with Section 02 81 00 - Hazardous Materials.
  - .2    Submit a site-specific Contaminant Prevention Plan (CPP) identifying the proper procedures and actions to be implemented to prevent potentially or expected hazardous substances due to the presence of any hazardous substances within the project site. The intent of the CPP is to:
    - .1    Prevent introduction of designated substances (DS) into air, water, or ground;
    - .2    Detail provisions for storage and handling of these materials in compliance with Federal, Provincial, and Municipal laws.

**1.3            FIRES**

- .1    Fires and burning of rubbish on site is not permitted.

**1.4            NOTIFICATION**

- .1    Contract Administrator will notify Contractor in writing of observed noncompliance with Federal, Provincial environmental laws and regulations or Municipal environmental bylaws, permits, and other elements of site-specific plans.
- .2    Contractor after receipt of such notice, shall inform Contract Administrator of proposed corrective action and take such action to obtain the approval of Contract Administrator.
  - .1    Take action only after receipt of written approval by Contract Administrator.
- .3    Contract Administrator will issue stop order of work until satisfactory corrective action has been taken.
- .4    No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

**Part 2            Products**

**2.1            NOT USED**

- .1    Not Used.

**Part 3 Execution**

**3.1 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Bury rubbish and waste materials on site is nor permitted.
- .3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.
- .4 Proceed with final cleaning upon completion and removal of surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

**END OF SECTION**

**Part 1 General**

**1.1 SUMMARY**

- .1 This Section references to laws, by laws, ordinances, rules, regulations, codes, orders of Authority Having Jurisdiction, and other legally enforceable requirements applicable to Work and that are; or become, in force during performance of Work.

**1.2 REFERENCES TO REGULATORY REQUIREMENTS**

- .1 Department of Justice Canada (Jus)
  - .1 SOR/2018-196 Prohibition of Asbestos and Products Containing Asbestos Regulations.
  - .2 Perform Work in accordance with The Manitoba Building Code and the latest adopted National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
  - .3 Specific design and performance requirements listed in specifications or indicated on Drawings may exceed minimum requirements established by referenced Building Code; these requirements will govern over the minimum requirements listed in Building Code
    - .1 Meet or exceed requirements of:
      - .1 Contract documents.
      - .2 Specified standards, codes and referenced documents.

**1.3 HAZARDOUS MATERIAL DISCOVERY**

- .1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Contract Administrator.
- .2 PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Contract Administrator.
- .3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Contract Administrator.

**1.4 BUILDING SMOKING ENVIRONMENT**

- .1 Comply with smoking restrictions and municipal by-laws.

**1.5 QUALITY ASSURANCE**

- .1 Regulatory Requirements: Except as otherwise specified, Contractor shall apply for, obtain, and pay fees associated with, permits, licenses, certificates, and approvals required by regulatory requirements and Contract Documents, based on General Conditions of Contract and the following:
  - .1 Regulatory requirements and fees in force on date of Bid submission, and
  - .2 A change in regulatory requirements or fees scheduled to become effective after date of tender submission and of which public notice has been given before date of tender submission

**Part 2            Products**

**2.1                NOT USED**

.1                Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1                Not Used.

**END OF SECTION**



## **1. GENERAL**

### **1.1 INSPECTION**

- .1 Allow Contract Administrator access to Work. If part of Work is in preparation at locations other than the Sites, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Contract Administrator instructions, or law of Place of Work.
- .3 If Contractor covers or permits to be covered any Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Contract Administrator will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such Work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

### **1.2 INDEPENDENT INSPECTION AGENCIES**

- .1 All material testing required to meet the Specifications is Quality Control (QC) Testing. All QC to be conducted by Contractor engaged certified material testing laboratory.
- .2 Independent Inspection/Testing Agencies shall be engaged by the Contractor for purpose of inspecting and/or testing portions of Work as required by this Contract. Cost of such services and related items will be borne by the Contractor.
- .3 Provide equipment required for executing inspection and testing by appointed agencies.
- .4 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .5 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Contract Administrator at no cost to the City. Pay costs for retesting and reinspection.

### **1.3 Access to Work**

- .1 Allow inspection/testing agencies access to Work.
- .2 Co-operate to provide reasonable facilities for such access.

### **1.4 Procedures**

- .1 Notify appropriate agency and Contract Administrator 10 Business Days in advance of requirement for tests, in order that attendance arrangements can be made.

- .2 Submit samples and/or materials required for testing, as specifically requested in Specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on Site. Provide sufficient space to store and cure test samples.

### **1.5 Rejected Work**

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Contract Administrator as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Contract Administrator it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, the City will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Contract Administrator in accordance with the General Conditions - Valuation of a Change in Work.

### **1.6 Reports**

- .1 Submit electronic copies of inspection and test reports to Contract Administrator.
- .2 Provide copies to subcontractor, manufacturer, or fabricator of work or material being inspected or tested.

### **1.7 Tests and Mix Designs**

- .1 Furnish test results and mix designs as requested in Section 03 30 00 – Cast-In-Place Concrete.
- .2 Furnish concrete mix designs as requested no less than 14 Calendar Days before pouring concrete.
- .3 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Contract Administrator and may be authorized as recoverable.

### **1.8 Mill Tests**

- .1 Submit mill test certificates as requested.

## **2. PRODUCTS**

### **2.1 Not Used**

- .1 Not Used.

**3. EXECUTION**

**3.1 Not Used**

.1 Not Used.

**END OF SECTION**

## **1. GENERAL**

### **1.1 SUBMITTALS**

- .1 Submittals to be in accordance with Section 01 33 00 – Submittals.
- .2 Shop drawing shall bear the stamp of qualified professional engineer registered in Manitoba as required.

### **1.2 INSTALLATION AND REMOVAL**

- .3 Provide temporary controls in order to execute Work expeditiously.
- .4 Remove from site all such work after use.

### **1.3 GUARD RAILS AND BARRICADES**

- .1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.
- .2 Provide as required by governing authorities as indicated.
- .3 Provide welding screens for on-site welding.

### **1.4 WEATHER ENCLOSURES**

- .1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.
- .2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
- .3 Design enclosures to withstand wind pressure and snow loading.

### **1.5 DUST TIGHT SCREENS**

- .1 Provide dust tight screens or insulated partitions to localize dust generating activities, and for protection of workers and finished areas of Work.
- .2 Maintain and relocate protection until such work is complete.

### **1.6 ACCESS TO SITE**

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

### **1.7 PUBLIC TRAFFIC FLOW**

- .1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

### **1.8 FIRE ROUTES**

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

### **1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY**

- .1 Protect surrounding private and public property from damage during performance of Work.

- .2 Be responsible for damage incurred.

**1.10 PROTECTION OF BUILDING FINISHES**

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with the City and/or Contract Administrator locations and installation schedule 3 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

**2. Products**

**2.1 Not Used**

- .1 Not Used.

**3. Execution**

- .1 Not used.

**END OF SECTION**

## **1. GENERAL**

### **1.1 REFERENCE STANDARDS**

- .1 Conform to the reference standards, in whole or in part as specifically requested in the Specifications.
- .2 If there is question as to whether products or systems are in conformance with applicable standards, the City reserves right to have such products or systems tested to prove or disprove conformance.
- .3 Cost for such testing will be borne by the City in event of conformance with Contract Documents or by Contractor in event of non-conformance.

### **1.2 QUALITY**

- .1 Materials incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout the site.
- .3 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

### **1.3 AVAILABILITY**

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify the City and/or Contract Administrator of such, in order that remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify the City and/or Contract Administrator at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the City reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

### **1.4 STORAGE, HANDLING AND PROTECTION**

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .7 Remove and replace damaged products at the Contractor's expense and to satisfaction of the City.

- .8 Touch-up damaged factory finished surfaces to the City's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

#### **1.5 TRANSPORTATION**

- .1 Pay costs of freight and cartage of Materials required in performance of Work.

#### **1.6 MANUFACTURER'S INSTRUCTIONS**

- .1 Unless otherwise indicated in Specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Contract Administrator in writing, of conflicts between Specifications and manufacturer's instructions, so that Contract Administrator will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Contract Administrator to require removal and re-installation at no increase in Contract Price or Contract Time.

#### **1.7 QUALITY OF WORK**

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Contract Administrator if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties.

#### **1.8 CO-ORDINATION**

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

#### **1.9 CONCEALMENT**

- .1 Conceal conduits, and wiring below grade and within the pole structure, except where indicated otherwise.
- .2 Before installation inform Contract Administrator if there is interference. Install as directed by Contract Administrator.

#### **1.10 REMEDIAL WORK**

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

#### **1.11 LOCATION OF FIXTURES**

- .1 Consider location of fixtures, outlets, and electrical items indicated as approximate.
- .2 Inform Contract Administrator of conflicting installation. Install as directed.

#### **1.12 FASTENINGS**

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.

- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected Specification section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

#### **1.13 FASTENINGS - EQUIPMENT**

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

#### **1.14 PROTECTION OF WORK IN PROGRESS**

- .1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Contract Administrator.

#### **1.15 EXISTING UTILITIES**

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

### **2. PRODUCTS**

#### **2.1 NOT USED**

- .1 Not Used.

### **3. EXECUTION**

#### **3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**



## **1. GENERAL**

### **1.1 PROJECT CLEANLINESS**

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .2 Remove waste materials from Site at daily regularly scheduled times or as directed by Contract Administrator. Do not burn waste materials on Site.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 If required, provide on-site containers for collection of waste materials and debris. Do not allow waste material to accumulate on the Site.
- .5 Dispose of waste materials and debris at designated dumping areas.
- .6 Store volatile waste in covered metal containers and remove from premises at end of each working day.
- .7 Provide adequate ventilation during use of volatile or noxious substances. Use only cleaning materials recommended by manufacturer of surface to be cleaned and as recommended by cleaning material manufacturer.

### **1.2 Final Cleaning**

- .1 Upon attaining Substantial Performance, the Contractor shall remove any Plant and Material not required for the performance of the remaining Work. The Contractor shall also remove waste and debris other than that caused by the City or other contractors and leave the Site and the Work clean and suitable for occupancy by the City unless otherwise specified.
- .2 Remove waste products and debris and leave the Site and the Work clean and suitable for occupancy.
- .3 Total Performance shall not be considered to have been achieved until the Contractor has cleaned up the Site and has removed all Plant, surplus Material, waste, and debris, other than that left by the City or other contractors.
- .4 Remove stains, spots, marks, and dirt from electrical and mechanical fixtures.
- .5 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .6 Remove debris and surplus materials from crawl areas and other accessible concealed space.

## **2. PRODUCTS**

### **2.1 Not Used**

- .1 Not Used.

**3. EXECUTION**

**3.1 Not Used**

.1 Not Used.

**END OF SECTION**

**1. GENERAL**

**1.1 SUBSTANTIAL PERFORMANCE**

.1 Substantial Performance in accordance with the Supplemental Conditions.

**1.2 TOTAL PERFORMANCE**

.1 Total Performance in accordance with the Supplemental Conditions.

**1.3 WARRANTY**

.1 Warranty in accordance with the Supplemental Conditions.

**1.4 Final Cleaning**

.1 Clean in accordance with Section 01 74 11- Cleaning.

**2. PRODUCTS**

.1 Not Used.

**3. EXECUTION**

.1 Not Used.

**END OF SECTION**

## **1. GENERAL**

### **1.1 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit four (4) final copies of operating and maintenance manuals in English to Contract Administrator two (2) weeks prior to Substantial Performance of Work.
- .3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .4 Provide evidence, if requested, for type, source and quality of products supplied.

### **1.2 FORMAT**

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm (8.5" x 11") with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings.
  - .1 Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6 Provide a tabbed flyleaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
  - .1 Bind in with text. Fold larger drawings to size of text pages.
- .9 Provide digital PDF copies of all documentation organized same as the binder.
- .10 Provide digital PDF copies of all As-Built drawings along with hardcopy.

### **1.3 Contents – Operation and Maintenance Manuals**

- .1 Table of Contents for each volume:
  - .1 Provide title of project.
  - .2 Date of submission.

- .3 Name addresses and telephone numbers of Consultant and Contractor with name of responsible parties.
- .4 Schedule of products and systems indexed to content of volume.
- .2 For each product or system:
  - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
  - .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
  - .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems to show control and flow diagrams.
  - .5 Typewritten Text: as required to supplement product data.
    - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.
  - .6 Training: refer to Section 01 79 00.13 - Demonstration and Training for Building Commissioning.

#### **1.4 MARK UP DOCUMENTS AND SAMPLES**

- .1 Maintain record documents in clean, dry and legible condition.
  - .1 Do not use record documents for construction purposes.
- .2 Keep record documents and samples available for inspection by Contract Administrator.
- .3 For the mark-up documents record information on a set of Contract Drawings.
- .4 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .5 Record information concurrently with construction progress.
  - .1 Do not conceal Work until required information is recorded.
- .6 Contract Drawings and Shop Drawings: mark each item to record actual construction, including:
  - .1 Measured depths of elements of foundation in relation to finish first floor datum.
  - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
  - .4 Field changes of dimensions and details.
  - .5 Changes made by Change Work Orders.

- .6 Details not on original Contract Drawings.
  - .7 Referenced standards to related Shop Drawings and modifications.
  - .8 Routing and sizes of all pipes and wiring and conduit.
  - .9 Measure location of installed equipment
- .7 Specifications: mark each item to record actual construction, including:
- .1 Manufacturer, trade name, and catalogue number of each product actually installed particularly optional items and substitute items.
  - .2 Changes made by Addenda and Change Work Orders.
- .8 Other Documents: maintain inspection certifications, field test records, manufacturer's certifications, required by individual specifications sections.
- .9 Provide digital photos, if requested, for site records.

### **1.5 Materials And Finishes**

- .1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
  - .1 Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional requirements: as specified in individual specifications sections.

### **1.6 Maintenance Materials**

- .1 Spare Parts:
  - .1 Provide spare parts, in quantities specified in individual specification sections.
  - .2 Provide items of same manufacture and quality as items in Work.
  - .3 Deliver to site, place, and store.
  - .4 Receive and catalogue items.
    - .1 Submit inventory listing to Contract Administrator.
    - .2 Include approved listings in Maintenance Manual.
  - .5 Obtain receipt for delivered products and submit prior to final payment.
- .2 Extra Stock Materials:

- .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Deliver to site, place, and store.
- .4 Receive and catalogue items.
  - .1 Submit inventory listing to Contract Administrator.
  - .2 Include approved listings in Operation and Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.
- .3 Special Tools:
  - .1 Provide special tools, in quantities specified in individual specification sections.
  - .2 Provide items with tags identifying their associated function and equipment.
  - .3 Deliver to location as directed, place and store.
  - .4 Receive and catalogue items.
    - .1 Submit inventory listing to Contract Administrator.
    - .2 Include approved listings in Operation and Maintenance Manual.

**1.7 Delivery, Storage and Handling**

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and for review by Contract Administrator.

**2. PRODUCTS**

- .1 Not Used.

**3. EXECUTION**

- .1 Not Used.

**END OF SECTION**

## **1. GENERAL**

### **1.1 REFERENCE STANDARDS**

- .1 Canadian Environmental Protection Act, 1999 (CEPA 1999)
  - .1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).
- .2 Department of Justice Canada (Jus)
  - .1 Transportation of Dangerous Goods Act, 1992 (TDG Act) 1992, (c. 34).
  - .2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 WHMIS Safety Data Sheets (SDS).
- .4 National Research Council Canada (NRC)
  - .1 National Fire Code of Canada 2015 (NFC).
- .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards.
  - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.
  - .2 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

### **1.2 DEFINITIONS**

- .1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
- .2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into environment.
- .3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment, or disposal.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for hazardous materials and include product characteristics, performance criteria, physical size, finish, and limitations.
  - .2 Submit two copies of WHMIS Safety Data Sheets (SDS) in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures to the Contract Administrator for each hazardous material required prior to bringing hazardous material on site.
  - .3 Hazardous waste classification: identify waste codes applicable to each hazardous waste material based on applicable federal and provincial acts, regulations, and guidelines. Waste profiles, analyses, and classification submitted to contract offices for review and approval.
- .3 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .4 Delivery and Acceptance Requirements: deliver materials to Site in original factory packaging, labelled with manufacturer's name and address.



- .5 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
- .6 Storage and Handling Requirements:
  - .1 Co-ordinate storage of hazardous materials with the Contract Administrator and abide by internal requirements for labelling and storage of materials and wastes.
  - .2 Store and handle hazardous materials and waste in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
  - .3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada (NFC) requirements.
  - .4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene, and naphtha for ready use.
    - .1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.
    - .2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Contract Administrator.
  - .5 Transfer of flammable and combustible liquids is prohibited within buildings.
  - .6 Transfer flammable and combustible liquids away from open flames or heat-producing devices.
  - .7 Solvents or cleaning agents: non-flammable or have flash point above 38 degrees C.
  - .8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
  - .9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.
  - .10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
    - .1 Store hazardous materials and wastes in closed and sealed containers.
    - .2 Label containers of hazardous materials and wastes in accordance with WHMIS.
    - .3 Store hazardous materials and wastes in containers compatible with that material or waste.
    - .4 Segregate incompatible materials and wastes.
    - .5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.
    - .6 Store hazardous materials and wastes in secure storage area with controlled access.
    - .7 Maintain clear egress from storage area.
    - .8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.
    - .9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.
    - .10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.
    - .11 When hazardous waste is generated on site:
      - i. Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.
      - ii. Report spills or accidents immediately to the Contract Administrator and the City. Submit a written spill report to the Contractor Administrator and the City within 24 hours of incident.

## **2. PRODUCTS**

### **2.1 MATERIALS**

- .1 Description:
  - .1 Bring on site only quantities hazardous material required to perform Work.
  - .2 Maintain WHMIS Safety Data Sheets (SDS) in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.
  - .3 Spill Response Materials: provide spill response materials which can be used for absorbing/shoveling and containing hazardous materials.
  - .4 Provide personal protective equipment.

## **3. EXECUTION**

### **3.1 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 00 - Cleaning.

**END OF SECTION**

## **1 GENERAL**

### **1.1 REFERENCES**

- .1 All standard to be latest edition.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA-O86S1 Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
  - .3 CSA O121 Douglas Fir Plywood.
  - .4 CSA O151 Canadian Softwood Plywood.
  - .5 CSA O153 Poplar Plywood.
  - .6 CAN/CSA-O325.0 Construction Sheathing.
  - .7 CSA O437 Standards for OSB and Waferboard.
  - .8 CSA S269.1 Falsework for Construction Purposes.
  - .9 CSA S269-3 Concrete Formwork
- .3 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S701 Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

### **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals to be in accordance with Section 01 33 00 - Submittals or specific Work requirements as provided for submittal procedures.
- .2 Submit shop drawings for formwork/falsework.
- .3 Indicate method and schedule of construction, shoring, stripping, and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts.
- .4 Comply with CAN/CSA-S269.3 for formwork drawings and CSA S269.1 for falsework drawings.
- .5 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms.
- .6 Indicate sequence of erection and removal of formwork/falsework to Contract Administrator.
- .7 Shop drawing shall bear the stamp of qualified Professional Engineer registered in Manitoba.
- .8 Formwork, falsework, and reshoring are to be reviewed by the same Professional Engineer prior to each concrete pour.

### **1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Store and manage hazardous materials in accordance with Division 1 and City's specific site requirements.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling as approved by Contract Administrator.
  - .2 Place materials defined as hazardous or toxic in designated containers.

- .3 Divert wood materials from landfill to a recycling, reuse or composting facility as approved by Contract Administrator.
- .4 Divert plastic materials from landfill to a recycling, reuse or composting facility as approved by Contract Administrator.
- .5 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Contract Administrator.

## **2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Formwork materials:
  - .1 Wood and wood product formwork materials to CSA-O121.
  - .2 Rigid insulation board: as per section 07 21 13 Board insulation.
    - .1 Acceptable Material: Dupont/Dow High load 60 or approved equal in accordance with B7 of the Bidding Procedures.
  - .2 Form ties:
    - .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
  - .3 Form release agent: non-toxic, biodegradable, low VOC.
  - .4 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 70 and 110s Saybolt Universal 15 to 24 mm<sup>2</sup> /s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.
  - .5 Falsework materials: to CSA-S269.1.

## **3 EXECUTION**

### **3.1 FABRICATION AND ERECTION**

- .1 Verify lines, levels, and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Fabricate and erect falsework in accordance with CSA S269.1.
- .3 Do not place shores and mud sills on frozen ground.
- .4 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .5 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations, and levels indicated within tolerances required by CSA-A23.1/A23.2.
- .6 Align form joints and make watertight.
  - .1 Keep form joints to minimum.
- .7 Use 20 mm chamfer strips on external corners and 20 mm fillets at interior corners, joints, unless specified otherwise.
- .8 Form chases, slots, openings, drips, recesses, expansion, and control joints as indicated.
- .9 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.

- .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .10 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

### 3.2 REMOVAL AND RESHORING

- .1 Notify Contract Administrator 48 hours in advance prior to removing formwork.
- .2 Do not remove forms and bracing until concrete has gained sufficient strength to carry its own weight, construction loads, design loads that are liable to be imposed upon it. Verify strength of concrete by compressive test results.
- .3 Leave formwork in place for following minimum periods of time after placing concrete:

LOCATION	TEMPERATURE IN °C		
	21-35	15-21	10-15
Side Forms	2 days	3 days	4 days
Slabs/Pads	14 days	17 days	21 days
Structural Shoring	14 days	17 days	21 days

- .4 Reshore structural members where required due to design requirements or construction conditions and as required to permit progressive construction. Remove forms supporting loads only when concrete has attained 75% of required 28-day compressive strength, provided construction is reshored.
- .5 Remove formwork progressively and in accordance with applicable standards and so that no shock loads or unbalanced loads are imposed on structure.
- .6 Loosen forms carefully. Do not wedge pry bars, hammers, or tools against concrete surfaces.
- .7 Store removed forms, for exposed concrete, so surfaces in contact with fresh concrete will not be damaged. Marked or scored forms will be rejected.
- .8 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

**END OF SECTION**

## **1 GENERAL**

### **1.1 REFERENCE STANDARDS**

- .1 All standards to be latest edition.
- .2 American Concrete Institute (ACI):
  - .1 ACI 318/318M, Building Code Requirements for Structural Concrete and Commentary
  - .2 ACI 301, Specification for Structural Concrete
- .3 American Society for Testing and Materials (ASTM):
  - .1 ASTM A82/A82M, Cold-Drawn Steel Wire for Concrete Reinforcement
  - .2 ASTM A185/A185M, Welded Steel Wire Reinforcement for Concrete
  - .3 ASTM A496/A496M, Deformed Steel Wire for Concrete Reinforcement
  - .4 ASTM A497/A497M, Welded Deformed Steel Wire Reinforcement for Concrete
  - .5 ASTM A615/A615M, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
- .4 Canadian Standards Association (CSA):
  - .1 CSA A3000, Portland Cement/Masonry Cement/Blended Hydraulic Cement
  - .2 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction
  - .3 CSA A23.3, Design of Concrete Structures
  - .4 CSA G30.18, Carbon Steel Bars for Concrete Reinforcement
  - .5 CSA W47.1, Certification of Companies for Fusion Welding of Steel
  - .6 CSA W59, Welded Steel Construction (Metal Arc Welding)
  - .7 CSA W117.2, Code for Safety in Welding and Cutting (Requirements for Welding Operators) Allied Processes
  - .8 CSA W178.1, Certification of Welding Inspection Organizations
  - .9 CSA W178.2, Certification of Welding Inspectors
  - .10 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction
- .5 Reinforcing Steel Institute of Canada (RSIC):
  - .1 RSIC Manual of Standard Practice

### **1.2 SUBMITTALS**

- .1 Provide required information in accordance with Section 01 33 00 – Submittal Procedures or specific Work requirements as provided for submittal procedures.
- .2 Action submittals: Provide the following submittals before starting any work of this Section:
  - .1 Shop Drawings: Submit Shop Drawings conforming to CSA A23.1/A23.2 and RSIC Manual of Standard Practice, consisting of bending, cutting and placing drawings for reinforcing steel, and as follows:
    - a. Prepare Shop Drawings such that all reinforcement can be carried out without reference to the Structural Drawings.

- b. Indicate concrete cover to reinforcing.
  - c. Indicate bar bending details, lists, and placing in drawings including but not limited to sizes, spacing, lengths, location and quantities of reinforcement, splices and laps, and mechanical connections, with identifying code marks to permit correct placement, spacing and location of spacers and hangers.
  - d. Indicate stirrup spacing, bent bar diagrams, tie spacing bar arrangement, hoop spacing, and supports for concrete reinforcement.
- .2 Slab plan: Submit a floor plan showing the location of all construction joints and the proposed pour sequence.
  - .3 Method of aligning dowels: Unless PNA dowel aligners or approved equal in accordance with B7 of the Bidding Procedures are to be used, describe proposed method in detail.
- .3 Informational Submittals: Provide the following submittals when requested by the Contract Administrator:
    - .1 Certificates: Submit copies of welding certificates applicable to welding procedures and personnel.

### **1.3 QUALITY ASSURANCE**

- .1 Regulatory Requirements: Design and detail lap lengths and bar development lengths in accordance with CSA A23.1/A23.2.
- .2 Informational Submittals: Provide the following submittals when requested by the Contract Administrator:
  - .1 Certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.
  - .2 Fabrication: Reinforcement fabrication, placement, and support in accordance with CAN/CSA A23.1/A23.2.
  - .3 Welding: Qualify procedures and personnel according to the following:
    - .1 Welders shall be qualified by Canadian Welding Bureau for classification of work being performed.
    - .2 The fabricator shall be certified to CSA W47.1, Division 1 or 2.1.
    - .3 Perform welding inspection to CSA W178.
  - .2 Resistance welding: to CSA W55.3.
  - .3 Fusion welding: to CSA W59.

### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Delivery and Acceptance Requirements: Deliver, store, and handle steel reinforcement to prevent bending and damage.

## **2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Reinforcing Bars: Deformed steel bars meeting requirements of CSA G30.18, Grade 400 and 400W.
- .2 Welded Wire Reinforcement (WWR):

- .1 Plain: In accordance with ASTM A185; plain, fabricated from as drawn steel wire into flat sheets; sizes as indicated on Drawings.
- .2 Deformed: In accordance with ASTM A497; deformed, fabricated into flat sheets; sizes as indicated on Drawings.
- .3 Reinforcing steel couplers: type and grade to be reviewed by the Contract Administrator.
- .4 Supports: To CAN/CSA A.23.1/A23.2, wire chairs, bolsters, reinforcing bars, precast concrete blocks and plastic spacers of size and strength to adequately support reinforcing in required position.
  - .1 Acceptable Materials: Dayton-Superior or approved equal in accordance with B7 of the Bidding Procedures.
- .5 Tie wire: 1.5 mm diameter annealed wire as noted on the Drawings.

## **2.2 REINFORCEMENT ACCESSORIES**

- .1 Joint Dowel Bars: ASTM A615/A615M, minimum Grade 400, plain steel bars, cut bars true to length with ends square and free of burrs.
- .2 Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to RSIC's Manual of Standard Practice, of greater compressive strength than concrete.

## **2.3 FABRICATION**

- .1 Fabricate reinforcing as directed in CSA A23.1/A23.2.
- .2 Weld in accordance with CSA W186.
- .3 Obtain Contract Administrator's approval for locations of reinforcement splices other than shown on steel placing Drawings.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

## **3 EXECUTION**

### **3.1 PREPARATION**

- .1 Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials detrimental to bond with concrete.
- .2 Accurately position, support, and secure reinforcement against displacement; locate and support reinforcement with bar supports to maintain minimum concrete cover; do not tack weld crossing reinforcing bars.
- .3 If welding is allowed by the Contract Administrator, weld reinforcing bars according to CWB requirements.
- .4 Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- .5 Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging; lap edges and ends of adjoining sheets at least one mesh spacing; offset laps of adjoining sheet widths to prevent continuous laps in either direction; lace overlaps with wire.

### **3.2 INSTALLATION**

- .1 Detailing: Conform to CSA A23.1/A23.2 for all hooks, bends, laps and similar details not specifically shown and as follows:



- .1 Support bars generally are not shown in the drawings. Provide adequate chairs, bolsters, bar support and spacers to rigidly support reinforcing steel during construction and maintain the specified concrete covers.
  - .2 Locate chairs for reinforcing at a maximum of 1200 mm centres; secure chairs in place to prevent displacement during placing of concrete.
  - .3 Detail and install all reinforcing including dowels as indicated on Drawings.
  - .4 Provide trimming rebars around slab openings as shown on the Drawings.
  - .5 Make all reinforcing crossing shrinkage strips discontinuous; provide 2 times a Class 'A' lap splices for all reinforcing thus discontinued.
- .2 Site Bending: Do not site bend reinforcement unless indicated or authorized by Contract Administrator:
- .1 When site bending is authorized, bend without heat, applying a slow and steady pressure.
  - .2 Replace bars that develop cracks or splits.
- .3 Placing: Do not cut or puncture vapour retarder; repair damage and reseal vapour retarder before placing concrete:
- .1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CSA A23.1/A23.2; before placing reinforcing, remove all loose scale, dirt, oil or other coatings which would reduce the bond; place bars accurately, with no bends or kinks other than those called for.
  - .2 Thickness of concrete cover to reinforcement, if not shown, is as stated in CSA A23.1/A23.2.
  - .3 Position of reinforcing steel shall take precedence over position of conduit or piping.
  - .4 Hold wall reinforcing mats in position to each other with 10M spacers at 40 mm horizontal and 1200 mm vertical centres.
  - .5 After initial fabrication, do not bend reinforcing bars unless so indicated on the Drawings.

### **3.3 FIELD QUALITY CONTROL**

- .1 Testing and Inspection: The Contract Administrator's general review, are undertaken to inform of the Contractor's performance, and in no way shall augment the Contractor's quality control procedures or relieve the Contractor of contractual responsibility:
- .1 Advise the Contract Administrator a minimum of 24 hours prior to the placement of concrete. Failure to give adequate notice may cause the Contract Administrator to classify the work as defective.
  - .2 Do not place concrete until reinforcement and its placement has been inspected by the Contract Administrator and Contractor's quality control representative.
  - .3 Correct defects and irregularities to the satisfaction of the Contract Administrator at no additional cost to the City.
  - .4 If required by the Contract Administrator, provide samples of reinforcing steel, at no charge from the project site for destructive testing by an independent agency.

**END OF SECTION**

## **1 GENERAL**

### **1.1 DEFINITIONS**

- .1 Delegated Design Professional Engineer: A professional engineer retained to produce delegated design submittals to meet requirements of the Project, and registered in the Province of Manitoba, and who is not the Contract Administrator.
- .2 Mass Concrete: Any volume of concrete with dimensions large enough to require special measures to account for generation of heat resulting from hydration of cement and attendant volume change to minimize cracking; or any concrete placements of 1000 mm thickness or thicker.
- .3 Workability: The term Workability broadly describes the total properties and expectations for concrete delivered to site as follows:
  - .1 Individual tested properties of concrete that account for confined or free flow slump, penetration, compaction, or relative plasticity of various concrete mix designs used for the project
  - .2 Overall properties involved with mixing, handling, transportation, and placement using vibratory compaction methods without loss of homogeneity of in-place concrete.

### **1.2 REFERENCE STANDARDS**

- .1 All standards to be latest edition.
- .2 American Society for Testing and Materials (ASTM):
  - .1 ASTM C33/C33M, Standard Specification for Concrete Aggregates
  - .2 ASTM C171, Standard Specification for Sheet Materials for Curing Concrete
  - .3 ASTM C260, Standard Specification for Air-Entraining Admixtures for Concrete
  - .4 ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
  - .5 ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete
  - .6 ASTM C618-12a, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
  - .7 ASTM C881/C881M, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
  - .8 ASTM C1059/C1059M, Standard Specification for Latex Agents for Bonding Fresh To Hardened Concrete
  - .9 ASTM D1751, Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
  - .10 ASTM D1752-04a, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
  - .11 ASTM E154, Standard Test Methods for Water Vapour Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
  - .12 ASTM E1155, Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers
- .3 Canadian Standards Association (CSA):
  - .1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete

- .2 CSA A23.3, Design of Concrete Structures
- .3 CSA A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005)
- .4 CSA A283, Qualification Code for Concrete Testing Laboratories
- .5 CSA W186-, Welding of Reinforcing Bars in Reinforced Concrete Construction

### 1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Delegated Design: Retain Delegated Design Professional Engineer to determine mix design complying with the requirements of the Manitoba Building Code and the Contract Documents and as follows:
  - .1 Certify that mix design for each type of concrete will produce specified properties.
  - .2 Certify that plant, equipment and materials used in concrete comply with requirements of CSA A23.1.
  - .3 Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- .2 Pre-Construction Meeting: Conduct pre-construction and pre-placement meetings at the Site in accordance with Contract Document requirements.

### 1.4 SUBMITTALS

- .1 Submittal Procedures set out in Section 01 33 00 Submittal Procedures.
- .2 Action Submittals: Provide the following submittals at least 4 weeks before starting any work of this Section:
  - .1 Product Data: Submit product data for each type of manufactured material and product indicated and as follows:
    - .1 Curing Agents: Submit product data for proposed curing agents where moist curing aids are not being used; curing agents that require mechanical means to remove or that do not breakdown during the normal course of construction will not be permitted for use on this project.
    - .2 Bonding Agent
    - .3 Joint filler
    - .4 Insulation
    - .5 Fiber board
    - .6 Foam rod
  - .3 Informational Submittals: Provide the following when requested by the Contract Administrator:
    - .1 Mix Design: Submit copies of design mixes for each concrete mix required for the Work; signed and sealed by Delegated Design Professional Engineer.
    - .2 Material Certificates: Submit certificates prepared by an approved testing agency indicating that concrete materials comply with requirements of CSA A23.1/A23.2 and CSA A3000 and requirements of this Specification and the Drawings before commencing any work and when any change in materials or source of supply is proposed.
    - .3 Source Quality Control Submittals:
      - .1 Mix Design: Submit details of design mixes for each concrete mix required for the project; design mix.
      - .2 Provide Contract Administrator, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.

- .3 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.
- .4 Temperature Control: Submit proposed concrete mat temperature control procedures to Contract Administrator for review and written acceptance prior to concrete placement.
- .5 Quality Plan: Submit quality plans prepared by the Contractor, concrete supplier, and concrete installer according to CSA A23.1, Annex J. The plan shall include proposed quality control procedures on the following items.
  - .1 Hot weather concrete.
  - .2 Cold weather concrete.
  - .3 Curing.
  - .4 Finishes
- .4 Project Conditions: For concrete supported by structural steelwork, submit written confirmation before starting concrete work stating that Contractor has reviewed the steel deck, shear studs, other components of the structural steelwork and reinforcing steel and that installation meets specified requirements; that designated steel testing agency has reviewed the installation; and that deficiencies (if any) have been corrected.
- .5 Site Quality Control Submittals: Submit records of as-cast floor surface elevations and corner of building coordinates to Contract Administrator for review in accordance with site engineering requirements.

## 1.5 QUALITY ASSURANCE

- .1 Regulatory Requirements: Provide materials and workmanship conforming to CAN/CSA A23.1/A23.2 and CSA A3000, including the following, unless modified by the requirements of the Contract Documents:
  - .1 General requirements, submittals, quality assurance documents
  - .2 Acceptance of structure, and protection of in-place concrete
  - .3 Formwork and form accessories
  - .4 Steel reinforcement and supports
  - .5 Concrete mixtures
  - .6 Handling, placing, and constructing concrete
- .2 Qualifications: Provide proof of qualifications when requested by Contract Administrator:
  - .1 Installer: Use an experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Contract and whose work has resulted in construction with a record of successful in-service performance.
  - .2 Delegated Design Professional Engineer: Retain a professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in ascertaining mix design and supplementary cement mixtures similar to those indicated for this Project.
  - .3 Manufacturer: A firm experienced in manufacturing ready-mixed concrete products complying with CSA A23.1, CSA A23.2 and CSA A3000 requirements for production facilities and equipment.
  - .4 Source Limitations: Obtain each type or class of cementing material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

## 1.6 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and Acceptance Requirements:
  - .1 Concrete hauling time: deliver to the Site of the Work and discharged within 120 minutes maximum after batching.
    - .1 Do not modify maximum time limit without receipt of prior written agreement from Contract Administrator and concrete producer as described in CSA A23.1/A23.2.
    - .2 Deviations to be submitted for review by Contract Administrator.
  - .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.
- .2 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials in accordance with Division 1 and the City's specific site requirements

## **2 PRODUCTS**

### **2.1 DESIGN CRITERIA**

- .1 Alternative 1 - Performance: to CSA A23.1/A23.2, and as described below in item 2.4 Mixes.

### **2.2 PERFORMANCE CRITERIA**

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Contract Administrator and provide verification of compliance as described in items 1.5 Quality Assurance, 3.16 Field Quality Control (by Concrete Trades), and 3.17 Field Quality Control.

### **2.3 MATERIALS**

- .1 Cement Type in accordance with CSA A3000 as required by exposure class:
  - .1 Normal Portland Cement, Type GU
  - .2 High sulphate-resistant hydraulic cement, Type HS
- .2 Fly Ash: Pozzolanic admixture meeting requirements of CSA A3001, F, added in quantities required to meet specified concrete performance properties and as follows:
  - .1 Include for additional supplementary cementing or cement replacement materials.
  - .2 Adjust mix design and curing regime to meet the CSA A23.1 requirements for concrete made with High Volume Supplementary Cementing Materials (HVSCM).
- .3 Concrete Admixtures: Certified by manufacturer to contain water soluble chloride ions that are not detrimental to concrete durability indicated by mass of cementing material and that are compatible with other admixtures and cementing materials as follows:
  - .1 Notify Contract Administrator in advance of mix design submission where calcium chloride containing admixtures are being proposed for use on the project; submit proof that concrete will not be damaged or have other deleterious effects by inclusion of these admixtures.
  - .2 Air Entraining Admixture: CAN/CSA A23.1/A23.2 and ASTM C260.
  - .3 Water Reducing Admixture: ASTM C494, Type A.
  - .4 High Range, Water Reducing Admixture: ASTM C494, Type F.
  - .5 Water Reducing and Accelerating Admixture: ASTM C494, Type E.
  - .6 Water Reducing and Retarding Admixture: ASTM C494, Type D.
  - .7 Corrosion Inhibiting Admixture:

- .1 Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
- .2 Acceptable Materials: Subject to compliance with requirements, products that may be incorporated into the Work include the following:
  - Catexol 1000CL; Axim Concrete Technologies.
  - MCI 2000 or MCI 2005; Cortec Corporation.
  - DCI or DCI-S; Grace Construction Materials.
  - Rheocrete 222+; Master Builders, Inc.
  - FerroGard-901; Sika Corporation; or
  - an approved equal in accordance with B7 of the Bidding Procedures.
- .4 Water: Meeting the requirements of CSA A23.1/A23.2.
- .5 Aggregate: Meeting the requirements of CSA A23.1/A23.2, containing no shale, and as follows:
  - .1 Normal Density Fine Aggregate: Nominal maximum aggregate size in accordance with CSA A23.2-1A, uniformly graded to maintain Workability and control water bleed out, as indicated on Drawings.
  - .2 Normal Density Coarse Aggregate: Aggregate selected from Group I or Group II Grading Classifications, to suit design mix, in accordance with CSA A23.2-13A, nominal maximum aggregate sizes and applications as indicated on Drawings.
  - .3 Ironstone content of aggregates in exposed interior or exterior concrete subject to intermittent or continuous wetting shall not exceed the following, when tested to ASTM C295-90:
    - .1 Coarse Aggregate: maximum 1% by mass
    - .2 Fine Aggregate Retained on 2.5 mm Sieve: maximum 1.5% by mass

## **2.4 MIXES**

- .1 Alternative 1 - Performance Method for specifying concrete: to meet Contract Administrator performance criteria to CSA A23.1/A23.2.
  - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.
  - .2 Provide concrete mix to meet following plastic state requirements:
    - .1 Workability: free of surface blemishes, loss of mortar and segregation.
  - .3 Provide concrete mix to meet following hard state requirements:
    - .1 Durability and class of exposure; as shown on drawings.
    - .2 Compressive strength to suit exposure class.
    - .3 Aggregate size 20 mm maximum.
  - .4 Provide quality management plan to ensure verification of concrete quality to specified performance.
  - .5 Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements (Table 5).
- .2 Where instructed, carry out trial mix and pre-construction mockup and testing to verify acceptability and performance.

## **2.5 ACCESSORY MATERIALS**

- .1 Concrete Bonding Agents: Not permitted unless reviewed by Contract Administrator.

- .1 Epoxy-Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:
  - .1 Type IV, load bearing, for bonding hardened concrete to hardened concrete
  - .2 Type V, load bearing, for bonding freshly mixed concrete to hardened concrete
- .2 Reglets: Fabricate reglets of not less than 0.46 mm thick galvanized steel sheet; temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- .3 Grout: Non-metallic, dry-pack or flowable material to suit application, 40 MPa compressive strength at 7 days, acid/alkali-resistant, expansion properties equal to the shrinkage of the cement content.
- .4 Grout under Machine Bases: Non-metallic, non-shrink, dry-pack or flowable material to suit application, 40 MPa compressive strength at 7 days, acid/alkali-resistant, expansion properties equal to the shrinkage of the cement content.

## 2.6 CURING MATERIALS

- .1 Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete for temporary protection during hot, dry and windy conditions:
  - .1 Submit to Contract Administrator for review prior to use.
- .2 Moist Curing Aids (any of the following or as agreed with the Contract Administrator):
  - .1 Absorptive Cover: AASHTO M182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 305 g/m<sup>2</sup> dry.
  - .2 Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.
  - .3 Water: Potable.
- .3 Concrete Curing Agent: Clear, waterborne membrane forming curing membrane meeting ASTM C309, Type 1, Class B and, if for interior use, chlorinated rubber based and guaranteed by the manufacturer to be compatible with specified subsequent finishes.

## 2.7 CONCRETE MIX DESIGN

- .1 Design ready-mix concrete conforming to CSA A23.1/A23.2, and to achieve performance properties contained in table located on the general notes of the Structural Drawings.
- .2 Select mix designs based on historical test data or trial batches that statistically demonstrate conformance to the specified requirements. Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan. The mix shall meet following requirements:
  - .1 Workability: free of surface blemishes, loss of mortar and segregation.
  - .2 Durability and class of exposure; as shown on drawings.
  - .3 Compressive strength to suit exposure class and as shown on drawings.
- .3 Aggregate size 20 mm maximum or as noted otherwise on the drawings.
- .4 Provide quality management plan to ensure verification of concrete quality to specified performance.
- .5 Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements, Table 5.
- .6 Coordinate mix designs proposed for use on the project with sustainable design requirements.

- .7 Submit mix designs in a format similar to that of Figure J.1 of CSA A23.1.
- .8 Indicate amounts of mix water to be withheld for later addition at the Work Site
- .9 Site mix concrete is permitted for placements not exceeding 1 m<sup>3</sup> and for core filling of non-load bearing masonry and bond beams.
- .10 Air content range and slump shall be verified at the point of discharge from the delivery equipment, measured prior to addition of plasticizing agents.
- .11 Add an air entraining admixture to all concrete exposed to the weather or in contact with the ground, producing entrained air in accordance with CSA A23.1, Table 4; air entraining admixture is not required for interior slabs on grade.
- .12 Obtain Contract Administrator's approval before using chemical admixtures other than those specified in this Section. Super plasticizing admixture shall only be used with prior authorization of the Contract Administrator.
- .13 Do not use chloride-based setting accelerators.
- .14 Use low shrinkage concrete in accordance with CSA 23.1 where noted on Drawings.

### **3 EXECUTION**

#### **3.1 EXAMINATION**

- .1 Project Conditions: Verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed prior to placing concrete.
- .2 All reinforcing must be in place and reviewed by Contract Administrator and Contractor's quality control representative before placing concrete; completeness of reinforcing is the responsibility of Contractor.

#### **3.2 CONCRETE PLACING: GENERAL**

- .1 Place concrete to CSA A23.1/A23.2 and as further described in this Section.
- .2 Provide Contract Administrator a minimum of 24 hours notice of intention to place concrete.
- .3 In preparation for placing concrete, remove all sawdust, debris, ice and snow from interior of forms, and clean reinforcing steel of form release agent.
- .4 Do not add water to concrete during delivery or during placement unless written acceptance has been provided by Contract Administrator; water may only be permitted at the Work Site subject to the limitations of CSA A23.1/A23.2:
  - .1 Do not add water to concrete if high range water reducing admixtures form a part of the concrete mix design.
- .5 Deposit concrete continuously or in layers to prevent new concrete being placed on concrete that has hardened enough to cause seams or planes of weakness; provide construction joints as specified where a section cannot be placed continuously; deposit concrete to avoid segregation.
- .6 Deposit and consolidate concrete for floors and slabs in a continuous operation; within limits of construction joints, until placement of a panel or section is complete:
  - .1 Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - .2 Maintain reinforcement in position on chairs during concrete placement.
  - .3 Screed slab surfaces to correct elevations.
- .7 Time lapse between the introduction of cement into the concrete mixes and final placement of the concrete into the forms shall not exceed 120 minutes.
- .8 During concreting operations:
  - .1 Development of cold joints not allowed.



- .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .9 Pumping of concrete is permitted only after approval of equipment and mix.
- .10 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .11 Prior to placing of concrete obtain Contract Administrator's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .12 Protect previous Work from staining.
- .13 Clean and remove stains prior to application for concrete finishes.
- .14 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .15 Do not place load upon new concrete until authorized by Contract Administrator.

### **3.3 TOLERANCES**

- .1 Finish floor slabs to tolerances listed in the Concrete Finishing Specifications unless specifically indicated otherwise.
- .2 Concrete cross sections, formed sections and column offsets, slab-on-grade, plumb, relative alignment and average slope in accordance with CSA A23.1, unless noted otherwise on Drawings or modified for architectural concrete and special finishes as indicated on the drawings.
- .3 Horizontal Surfaces: Comply with CSA A23.1 for slab and floor finish classifications and tolerances listed in the Concrete Finishing Specifications and as modified for areas indicated on the Drawings.

### **3.4 CONSTRUCTION JOINTS**

- .1 Construction joint details in accordance with CSA A23.1/A23.2.
- .2 Contract Administrator shall approve locations of construction joints other than those shown on Drawings in writing before placement of additional construction joints.
- .3 Maximum length of concrete pour for slabs shall be 50 metre, with a maximum aspect ratio of 2:1, unless noted otherwise on Drawings. Concrete slab design shall consider the pour length.

### **3.5 SLAB-ON-GRADE JOINTS**

- .1 Construct joints true to line with faces perpendicular to surface plane of concrete.
- .2 Construction Joints: Locate and install so as not to impair strength or appearance of concrete, at locations indicated on Drawings or as reviewed by Contract Administrator.
  - .1 Provide dowel bars, joint filler and joint sealant as per the design and details prepared by the reinforced concrete slab designer.

### **3.6 SLEEVES AND INSERTS**

- .1 Where approved by Contract Administrator, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
- .2 Sleeves and openings greater than 100 x 100 mm not indicated must be reviewed by Contract Administrator.
- .3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Contract Administrator before placing of concrete.
- .4 Confirm locations and sizes of sleeves and openings shown on the Drawings.

### **3.7 EMBEDDED CONDUIT**

- .1 Review conduit placement in slabs with Contract Administrator before placing; reinforcing steel location and structural integrity of the concrete system shall have precedence over conduit location in all circumstances.
- .2 Place embedded conduit at mid-depth of the slab.
- .3 Place embedded conduit with a minimum of 50 mm clear between conduits crossing each other; place conduits such that concrete cover to top and bottom of slab are not less than 60 mm.
- .4 Provide chairs and spacers for conduit to maintain required clearances.
- .5 Space conduits at minimum 150 mm horizontal centres.
- .6 Do not embed conduit larger than 50 mm outside diameter.

### **3.8 PROTECTION**

- .1 Protect fresh and immature concrete from surface drying and injurious degradation due to adverse weather conditions such as wind, precipitation and from excessive cold or hot temperatures.
- .2 Protection must be planned and available before each concrete placement is started.
- .3 Protect the exposed surface of concrete when the rate of surface moisture evaporation determined from Annex D of CSA A23.1/A23.2 exceeds 0.50 kg/m<sup>2</sup>/h.
- .4 Protective measures may include fog misting, application of evaporation retarders, wind breaks, and similar measures.
- .5 Temperature related concrete provisions of CSA A23.1/A23.2 will apply when there is a likelihood that the air temperature will fall below 5°C or rise above 27°C; vent exhaust gases from hydrocarbon fired heaters, if used, directly to the outside.
- .6 Protect exposed concrete members from staining or becoming coated with concrete arising from form mortar leakage, concrete spillage, and corrosion of reinforcing, or fluid leakage from equipment.

### **3.9 CONCRETE CURING**

- .1 Curing materials and equipment must be planned and available for all concrete placements.
- .2 Adhere to relevant guidelines on good construction practices for concrete curing as given in CSA A23.1.
- .3 Begin curing immediately following the placing and finishing operations.
- .4 Provide temperature and moisture conditions for the period of time necessary for concrete to develop the required properties and according to CSA A23.1.
- .5 Formed Surfaces: If removing forms before end of curing period, continue curing by one or a combination of methods listed below.
- .6 Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:
  - .1 Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - .1 Water ponding
    - .2 Continuous water sprinkling
    - .3 Absorptive cover, water saturated, and kept continuously wet; cover concrete surfaces and edges with 300 mm lap over adjacent absorptive covers.
  - .2 Moisture Retaining Cover Curing: Cover concrete surfaces with moisture retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 300 mm, and sealed by waterproof tape or adhesive; immediately repair any holes or tears during curing period using cover material and waterproof tape.

- .7 Curing compounds may only be used where the curing agent manufacturer and floor finish or covering manufacturer guarantees compatibility in writing prior to application. Do not use curing compounds if the subsequent finish is adhered by acrylic, epoxy or urethane resins.
  - .1 Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions:
    - .1 Recoat areas subjected to heavy rainfall within three hours after initial application.
    - .2 Maintain continuity of coating and repair damage during curing period.
  - .2 Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions:
    - .1 Recoat areas subjected to heavy rainfall within three hours after initial application.
    - .2 Repeat process 24 hours later and apply a second coat.
    - .3 Maintain continuity of coating and repair damage during curing period.

### **3.10 LOADING OF STRUCTURE**

- .1 Provide a minimum of 3 days of curing at minimum 10 degrees Celsius or for the time necessary to attain 40% of the specified concrete compressive strength to structural slabs prior to any loading.
- .2 Limit loading of structural slabs-on-grade to 2.4 kN/m<sup>2</sup> until the concrete has achieved specified 28-day strength.
- .3 Do not load area of structure where formwork is being removed until it is completely re-shored (where applicable).
- .4 Request from Contract Administrator maximum allowed loading of beams, soffits, suspended slabs, decks, and other structural members for the period when formwork, falsework, shoring, and re-shoring is removed until concrete has achieved specified 28-day strength.

### **3.11 SLEEVES, HOLES AND OPENINGS**

- .1 Do not place any sleeves, holes or openings in structural concrete other than shown on the Structural Drawings; submit locations of sleeves, holes and openings not shown on Drawings to Contract Administrator for review at least one (1) week prior to proceeding with the Work.
- .2 Submit locations of proposed cutting or coring through hardened concrete to Contract Administrator for review at least one (1) week prior to proceeding with the Work; the following conditions apply to cutting or coring of holes:
  - .1 Locate all reinforcement in the area of the proposed hole prior to cutting.
  - .2 Core drill holes up to 150 mm diameter; review proposed methods for cutting larger holes with Contract Administrator before proceeding.
  - .3 Drill upwards if necessary to avoid visible spalling of concrete where slabs have an exposed soffit.
- .3 Patch openings left in the construction and around pipes or ducts using mortar of the same proportions as the surrounding work; reinforce with welded wire fabric if necessary.
- .4 Form weep holes and drainage holes as indicated. If wood forms are used, remove them after concrete has set.

### **3.12 JOINT FILLERS**

- .1 Furnish and install joint filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Contract Administrator.

- .2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
- .3 Locate and form isolation joints as indicated.
- .4 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

### **3.13 SLABS ON COMPACTED FILL**

- .1 Ensure that compacted fill has been placed to meet specified requirements and that under-slab services have been installed, inspected, tested, and approved, prior to placing of concrete.
- .2 The tolerance on the final grade must be +0, -25mm. The surface shall be smooth and free from any sharp change in levelness.
- .3 Moisture content of the soil shall be approximately +/- 2% or as recommended by the geotechnical engineer.

### **3.14 MISCELLANEOUS**

- .1 Grout under all base plates and machine bases; mix and place in accordance with the manufacturer's recommendations which result in 100% contact over grouted area.

### **3.15 FINISHING AND CURING**

- .1 Finish concrete to CSA A23.1/A23.2.
  - .1 Finish exterior equipment slab surfaces to CSA A23.1, Table 21, Class A utilizing magnesium bull float followed by magnesium hand float for air entrained concrete and steel blade power trowel for non-air entrained concrete.
- .2 Use procedures as reviewed by Contract Administrator or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.

### **3.16 FIELD QUALITY CONTROL (BY CONCRETE TRADES)**

- .1 Provide a system of quality control to ensure that the minimum standards specified in this Section and related Sections are attained.
- .2 Provide and maintain facilities for temporary storage of concrete test cylinders as required by the City's independent testing agency.
- .3 Bring to the attention of Contract Administrator any defects in the work or departures from the Contract Documents that may occur during construction; Contract Administrator will decide upon corrective action and state recommendations in writing.
- .4 Contract Administrator's general review during construction and inspection and testing by independent inspection and testing companies reporting to Contract Administrator are both undertaken to reflect the Contractor's performance and shall in no way augment the Contractor's quality control or relieve them of contractual responsibility:
  - .1 Advise the Contract Administrator a minimum of 24 hours notice prior to the placement of concrete. Failure to give adequate notice may cause the Contract Administrator to classify the work as defective.
  - .2 Concrete shall not be placed until the reinforcement and its placement has been inspected by the Contract Administrator's and Contractor's quality control representatives.
  - .3 Correct defects and irregularities to the satisfaction of the Contract Administrator, at no cost to the City.
- .5 Site tests: conduct tests as follows and submit reports to Contract Administrator. Ensure testing laboratory is certified to CSA A283.
  - .1 Concrete pours.
  - .2 Slump.

- .3 Air content.
- .4 Compressive strength at 7 and 28 or 7 and 56 days, as required by exposure class.
- .5 Air and concrete temperature.
- .6 Acceptance of Structure: Failure to comply with requirements that control strength and durability will result in the structure being considered potentially deficient; a structure will be considered potentially deficient when:
  - .1 Concrete is not as specified.
  - .2 Reinforcing steel size, quantity, position, quality, or arrangement is not as specified or detailed.
  - .3 Improper curing.
  - .4 Inadequate protection of concrete from extremes of temperature during early stages of hardening and strength development.
  - .5 Mechanical injury from fire, construction overload or premature removal of forms.
  - .6 Poor workmanship.
  - .7 Failure to provide 24-hour notification to Contract Administrator for review of formwork and reinforcement before placing concrete.
  - .8 Concrete not within dimensional tolerances.
  - .9 Concrete not conforming to the lines, details, and grades specified herein or as shown on the Drawings shall be modified or replaced at the Contractor's expense and to the satisfaction of the Contract Administrator. Any additional tests as directed by Contract Administrator due to defective concrete shall be done at the Contractor's expense.

### 3.17 FIELD QUALITY CONTROL

- .1 Concrete Testing: The City will engage a qualified independent testing agency to perform site inspections and testing as follows:
  - .1 Perform a complete test set for each 70 m<sup>3</sup> of concrete, or fraction thereof, and in any event, not less than one test set for each type of concrete each day it is used.
    - .1 Each test set shall consist of a slump test, air content test, temperature measurement, and not less than three (3) moulded specimens for compression, all in accordance with A23.2-3C and as follows:
      - .2 Test one (1) cylinder at seven (7) days, moist cured.
      - .3 Where 28-day strength is specified:
        - Test two (2) cylinders at twenty-eight (28) days, moist cured.
      - .4 Where 56-day strength is specified:
        - Test one (1) cylinder at twenty-eight (28) days, moist cured.
        - Test two (2) cylinders at fifty-six (56) days, moist cured.
    - .2 Provide Contract Administrator with copies of all concrete test results at regular intervals mutually agreed upon; reports shall include the following:
      - .1 Project Name, City of Winnipeg, Contractor.
      - .2 Site location
      - .3 City of Winnipeg Tender Number
      - .4 Concrete Supplier.
      - .5 Date and Time of Sampling.

- .6 Temperature at Time of Sampling.
  - .7 Concrete Mix Design Identification.
  - .8 Exact location on the structure at which concrete is being placed.
  - .9 Specimen Number.
  - .10 Concrete Temperature.
  - .11 Specified concrete strength.
  - .12 Specified slump.
  - .13 Slump, measured at point of discharge from the delivery vehicle, prior to addition of plasticizing agents.
  - .14 Air content, specified and measured.
  - .15 Method of curing.
  - .16 Test number.
  - .17 Test date and age of cylinder.
  - .18 Cylinder strength and test result.
  - .19 Moving average of three consecutive strength tests as defined in Clause 4.4.6.6.1 of CSA A23.1 for the same class of concrete.
  - .20 Remarks regarding compliance.
- .2 A load test will normally only be required as a result of Contractor performing work not in accordance with the Contract:
- .1 Load test will be performed in accordance with the Manitoba Building Code.
  - .2 Costs of such a load test and repairs shall be borne by the Contractor.

### **3.18 REPAIR**

- .1 Remove and replace concrete that does not comply with requirements in this Section, at no charge to the City.
- .2 Repair all broken and chipped concrete; submit repair procedure to Contract Administrator before proceeding with repair work.
- .3 Repair shrinkage and expansion cracks occurring in walls and slabs; submit repair procedure to Contract Administrator before proceeding with repair work.

### **3.19 CLEANING**

- .1 Clean and manage waste in accordance with Division 1 and the City's specific site requirements.
  - .1 Washing of the concrete trucks on the site is not permitted.
  - .2 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by Contract Administrator.
  - .3 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
  - .4 Prevent admixtures and additive materials from entering drinking water supplies or streams.
  - .5 Using appropriate safety precautions, collect liquid or solidify liquid with inert, non-combustible material and remove for disposal.
  - .6 Dispose of waste in accordance with applicable City, Provincial and National regulations.

**END OF SECTION**

## **1 GENERAL**

### **1.1 SUMMARY**

.1 This Section includes requirements for supply and installation of the following:

.1 Insulation under slabs-on-grade.

### **1.2 REFERENCE STANDARDS**

.1 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.2 American Society for Testing and Materials (ASTM):

.1 ASTM D1621-10, Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

.2 ASTM D2842-06, Standard Test Method for Water Absorption of Rigid Cellular Plastics.

.3 Canadian General Standards Board (CGSB):

.1 CGSB 71-GP-24M, Adhesive, Flexible for Bonding Cellular Polystyrene Insulation.

.2 CAN/CGSB-37.5, Cutback Asphalt Plastic Cement.

### **1.3 SUBMITTALS**

.1 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for inclusion with project record documents. Keep one (1) copy of WHMIS safety data sheets on site for reference by workers.

### **1.4 DELIVERY, STORAGE AND HANDLING**

.1 Store insulation materials in dry areas, protected from wetting, sunlight and traffic. Store insulation board flat, on a flat surface, and to prevent edge damage and placing of materials on top of stored boards.

.2 Ensure that insulation board and adhesives are stored at a minimum temperature of 4 deg C for twelve (12) hours before installation, and that freezable adhesives are stored only at temperatures above 0 deg C at all times.

## **2 PRODUCTS**

### **2.1 MANUFACTURERS**

.1 Basis-of-Design Products: Products named in this Section were used as the basis-of-design for the project; additional manufacturers offering similar products may be incorporated into the work of this Section provided they meet the performance requirements established by the named products and provided they submit requests for substitution five (5) days in advance of Bid Closing.

.2 Acceptable Manufacturers: Subject to compliance with requirements specified in this Section, manufacturers offering products that may be incorporated into the Work include the following:

.1 Dow Canada.

.2 Owens-Corning Canada.

.3 Roxul Inc; or

.4 Approved equal in accordance with B7 of the Bidding Procedures



## 2.2 MATERIALS

- .1 Foundation and Under slab Insulation Board:
  - .1 Closed-cell, cellular, foamed, smooth skin, extruded expanded polystyrene, having 60 psi compressive strength, thicknesses as indicated on drawings and specified herein, conforming to CAN/ULC S701, Type IV.
    - .1 Basis of Design Materials:
      - .1 Styrofoam High load 60 by Dow Chemical Canada Inc. or approved equal in accordance with B7 of the Bidding Procedures
  - .2 Provide under slab insulation board with ship lapped edges.

## 3 EXECUTION

### 3.1 INSTALLATION

- .1 Install the insulation boards as per manufacturer recommendation.
- .2 Extend below slab boards from edge of the slab as shown on the drawings.
- .3 Lay boards on level compacted fill.

### 3.2 PROTECTION

- .1 Protect installed board insulation from damage due to harmful weather exposures, physical abuse, and other causes.
- .2 Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

**END OF SECTION**