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**Part 1            General**

**1.1                MINIMUM STANDARDS**

- .1    Execute work to meet or exceed:
  - .1    Manitoba Building Code 2011 including all amendments up to project date.
  - .2    Occupational Health and Safety Act and Regulations for Construction Projects.
  - .3    Canadian Construction Safety Code (Latest Edition).
  - .4    Rules and regulations of authorities having jurisdiction.
  - .5    City of Winnipeg Standard Construction Specifications

**1.2                OVERTIME**

- .1    Overtime costs shall be included in the Unit and Stipulated Prices provided in the form of Bid. No extra costs will be paid by the City for work which must be performed outside normal working hours.

**1.3                EXAMINATION OF PLANS SPECIFICATIONS AND SITE OF WORK**

- .1    Contractor shall carefully examine and study all of the contract specifications and the site of the work in order to satisfy themselves by examination as to all conditions affecting the contract, the detailed requirements of the construction and extent of work involved.
- .2    Contractor shall confirm overall dimensions and quantity of work and notify Contract Administrator of any discrepancies noted. No consideration shall be given for claims for extra compensations beyond that shown in the documents.
- .3    No Bidder may claim at any time after submission of a Bid that there was any misunderstanding of the terms and conditions of the contract relating to the site conditions.

**1.4                FORM OF AGREEMENT**

- .1    The City of Winnipeg General Conditions for construction will be used for this project. The General Conditions attached thereto and the Supplementary General Conditions contained within the specification will govern the performance of this project.
- .2    The Contractor must be familiar with this document.

**1.5                TAXES**

- .1    Pay applicable Federal, Provincial and Municipal taxes.

**1.6                FEES, PERMITS AND CERTIFICATES**

- .1    Provide authorities having jurisdiction with information requested.

- .2 The City will obtain the required building permit.
- .3 The Contractor shall include a cash allowance to pay for all certificate and permit fees. The Contractor shall reimburse the City for the cost of the building permit.
- .4 The contractor shall pay fees and obtain certificates and additional permits where required.
- .5 Furnish certificates and permits when requested.

#### **1.7 WORKERS COMPENSATION BOARD OF MANITOBA (WCB)**

- .1 The contractor shall, at the time of entering into any contract with the City, at such intervals as required to demonstrate good standing, and at substantial performance, provide a Clearance Certificate from the WCB.
- .2 The Bidder who's Bid has been recommended to the City for acceptance shall submit this Clearance Certificate to the Contract Administrator in triplicate together with the agreement. One (1) copy of the Clearance Certificate shall be bound into each of the three (3) executed sets of the contract.

#### **1.8 DOCUMENTS**

- .1 Keep one copy of contract documents on the site.
- .2 Specifications shall govern over Drawings.
- .3 Where details shown on the drawing or in the specification are not in accordance with manufacturer's requirement, Contractor to notify Contract Administrator immediately.

#### **1.9 ADDITIONAL DRAWINGS**

- .1 Contract Administrator may furnish additional drawings to clarify work.
- .2 Such documents become part of Contract Documents.

#### **1.10 AS-BUILT DRAWINGS**

- .1 Obtain from Contract Administrator at commencement of work, two (2) sets of white prints of drawings for purpose of recording changes and deviations to work as-built.
- .2 Maintain these prints and make available to trades so that all changes and deviations may be recorded promptly as they occur. Be responsible for ensuring that such record of all changes is up to date at all times. Upon completion of work, return these drawings complete and in good condition to Contract Administrator so that City will have record of exact location of all services and equipment.

#### **1.11 SUPERVISION**

- .1 Ensure that any defects discovered are corrected before continuing work.

- .2 Ensure site conditions are satisfactory for execution of work.
- .3 Address to Contract Administrator all questions on work. Contract Administrator will transmit verbal instructions through contractor's superintendent.
- .4 Co-ordinate all trades to provide a smooth, conflict free, flow of work.
- .5 The Contractor shall have a competent person for emergency calls after construction hours and during weekends. It shall be the Contractor's responsibility to supply the City's representative with the name and telephone number of the person to be contacted during these periods.

**1.12 PLANT**

- .1 Supply all transportation, labour, materials, shoring, scaffolds, tools, cranes, derricks, plant and equipment to continuously carry out work, in an efficient manner.

**1.13 CO-ORDINATION AND CO-OPERATION**

- .1 Site and building will be occupied and used during execution of work.
- .2 Execute work with minimum disturbance to occupants, public and normal use of site and building.
- .3 Maintain access and exits.
- .4 Where security has been reduced by work of contract, provide temporary means to maintain security.

**1.14 PROTECTION**

- .1 Refer to Section 01 56 00

**1.15 USE OF SITE FACILITIES**

- .1 Refer to Section 01 11 40.

**1.16 EXISTING SERVICES AND EQUIPMENT**

- .1 Prior to commencing repair work, the Contractor shall notify all public utilities and the City to locate telephone, gas, water, hydro cable and protective or alarm systems. All utilities and services shall be protected against damage or interruption. Notify City at least 48 hours in advanced of any necessary interruption. Any claims resulting from damage shall be the Contractor's responsibility.
- .2 The Contractor shall maintain existing services in occupied areas unless alternative arrangements have been made with and approved by the City.
- .3 The Contractor shall be responsible for clearing work areas of any equipment or obstructions in order to execute the Scope of Work. The Contractor shall account for all

costs and services required to remove, protect, relocate, reinstall and recommission these items.

#### **1.17 TEMPORARY FACILITIES AND SERVICES**

- .1 The Contractor shall provide and maintain temperature required to prevent frost damage to the work.
- .2 The Contractor shall provide and maintain temporary facilities and services required to carry out the work.
- .3 At the completion of the work, all temporary connections and equipment shall be removed and the services and finishes shall be made good by the Contractor to the satisfaction of the City.

#### **1.18 SITE ACCESS**

- .1 The Contractor shall provide access to and about the site to ensure continuous and efficient delivery and movement of materials and equipment. Arrange routes so that they do not conflict with City's operations.
- .2 The Contractor's bid must explicitly state the necessary site staging requirements, and maximum surface area required for staging and laydown of all equipment, materials and work areas.

#### **1.19 GARBAGE**

- .1 Refer to Section 01 74 21

#### **1.20 INTERFEENCE**

- .1 Work requiring the shutdown of any of the City's existing services or equipment must not be done without prior written approval and according to the agreed construction schedule unless other arrangements are specifically arranged for through Contract Administrator.

#### **1.21 CLEANING**

- .1 Refer to Section 01 74 12

#### **1.22 SPECIAL REQUIRMENTS & LIMITATIONS**

- .1 Restrict all personnel employed in connection with the work to the vicinity of the work site.
- .2 Prevent the unauthorized use of any and all facilities by such operatives or staff.

#### **1.23 MATERIAL AND EQUIPMENT**

- .1 Use new products unless otherwise specified.
- .2 Deliver and store material and equipment with manufacturer's labels and seals intact.

- .3 When material or equipment is specified by standard or performance specifications, upon request of Contract Administrator, obtain from manufacturer an independent testing laboratory report, stating that material or equipment meets or exceeds specified requirements.
- .4 The Contractor shall not use high velocity powder actuated fastening tools.

**1.24 FIRE PREVENTION**

- .1 Refer to Section 01 35 30

**1.25 CO-OPERATION**

- .1 The work shall be inspected on behalf of the City by Concentric Associates International Incorporated (Concentric). Concentric must be kept informed at all time when work is being carried out.
- .2 A minimum 48 hours noticed shall be given prior to the required inspection unless agreed upon otherwise.
- .3 Any work not accepted by the Contract Administrators shall be immediately corrected by the Contractor to the Contract Administrators satisfaction. Frequency of the testing carried out by Contractor will be determined by the Contract Administrator.

**1.26 ADDITIONAL CONTRACT ADMINISTRATORS FEE**

- .1 When the Contract Administrator incurs additional cost directly as a result of the failure of the Contractor to perform the Contract in a reasonable manner and when initial tests and inspections reveal work not to the requirements of the contract documents, the Contractor shall pay for additional tests, inspections, and contract administration required by the Contract Administrator for the corrected work. The additional fees (including GST) shall be deducted from the Contractors progress payment claims. The Contractor will be made aware of the Contract Administrators additional fees in writing. The Contract Administrators invoice will be submitted with the Contractors progress billing. The City will pay the Contract Administrator the amount deducted from the Contractors progress billing.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**Part 1           General**

**1.1               GENERAL CONDITIONS**

- .1       Sections of division 1 - general requirements, as applicable, shall form part of this summary and scope of work and of the contract.
- .2       Each Contractor shall examine and become familiar with the work, specifications and drawings of all other Contractors which may affect the Work of the Contractor.
- .3       This Summary and Scope of Work shall be read in conjunction with all other Contract Documents and form part of this Contract, and is intended to summarize the extent of the work and responsibilities to be undertaken by this Contractor.

**1.2               WORK BY OTHERS**

- .1       Co-operate with other Contractors in carrying out their respective works and carry out instructions from Contract Administrator.
- .2       Co-ordinate work with that of 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 Contract Administrator, in writing, any defects which may interfere with proper execution of work.

**1.3               PROJECT SUMMARY**

- .1       The City of Winnipeg wishes to conduct the following work at the Millennium Library Parkade:
- .2       Demolition and Removals:
  - .1       Remove six (6) existing boilers and associated equipment in both the Smith Street and Donald Street mechanical rooms (3 boilers per room).
  - .2       Remove the original glycol distribution piping downstream of both the Smith Street and Donald Street mechanical rooms, including the in-slab rubber hoses for Ramps 3, 5 and 6. This excludes the Smith street piping in Ramp 2 that was replaced in 2011.
  - .3       Remove the existing glycol loop encasements and in curb headers that boarder the inside laneway on Ramps 3, 5, and 6.
  - .4       Demolish and remove the existing concrete curbing that borders the outer laneway on Ramps 3, 5, and 6.
  - .5       Demolish and remove the entire area of the existing concrete topping on Ramps 3, 5 and 6, including the existing waterproofing and rigid insulation.
  - .6       Remove the existing trench drain grates on Ramps 2, 3, 5 and 6.
  - .7       Demolish the existing concrete trench drain at the base of Ramp 5.
  - .8       Remove existing traffic sensor cast into Ramp 6 Concrete Topping.
- .3       Mechanical and Electrical Systems:

- .1 Supply and install new glycol distribution piping downstream of both the Smith Street and Donald Street mechanical rooms, including new in-slab radiant tubing for Ramps 3, 5 and 6. This excludes the Smith street piping in Ramp 2 that was replaced in 2011.
  - .2 Supply and install distribution headers in both the Smith Street and Donald Street mechanical rooms for the new snow melt systems in Ramps 3, 5 and 6. This excludes the Smith header for Ramp 2 that was installed in 2011.
  - .3 Supply and install six (6) new boilers in the Smith Street and Donald Street mechanical rooms (3 per room), and provide all associated required equipment to facilitate the operation of the new snow melt systems.
  - .4 Supply and install slab temperature and snow/ice detector.
  - .5 Disconnect power from exiting mechanical devices being removed, and reconnect to new mechanical devices. Modify and extend wiring and conduit as required, and coordinate exact locations on site with mechanical equipment installation.
  - .6 Supply and Install new traffic sensor cast into Ramp 6 Concrete Topping
- .4 Structural and Architectural Systems:
- .1 Supply and install new reinforced concrete topping on ramps 3, 5 and 6, including new separation sheet and waterproofing.
  - .2 Supply and install new concrete curbing that borders the inner and outer laneways on ramps 3, 5, and 6.
  - .3 Perform localized top surface repairs to the exposed cast-in-place concrete walls along Ramps 3, 5 and 6.
  - .4 Touch up and reinstate the existing architectural concrete coatings in the areas where top surface repairs are required.
  - .5 Form and pour a new concrete trench drain at the base of Ramp 5
  - .6 Provide an injectable crack/leak repair along the joint between the ramp 2 suspended slab, and the interior retaining wall.

The above list is not an exhaustive list of all work required by the Contract Documents. Additional details, requirements and information that are part of the Contract can be found on the Construction Drawings.

#### **1.4 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 the City's occupied areas during construction.
- .3 Construct Work in stages to provide for continuous public usage. Do not close off public usage of facilities until use of one stage of Work will provide alternate usage.
- .4 Maintain fire access/control.

## **1.5 HOURS OF WORK**

- .1 The execution of work that generates excessive noise (greater than 85 dBA) shall be restricted to the following hours:
  - .1 Before 10:00am, Monday – Saturday;
  - .2 After 9:00pm, Monday – Thursday;
  - .3 After 6:00pm, Friday – Saturday;
  - .4 Anytime on Sunday; and,
  - .5 As directed by the City.

## **1.6 THE CITY 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 The City usage.

## **1.7 DOCUMENTS REQUIRED**

- .1 Maintain at job site, one copy each document as follows:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Reviewed Shop Drawings.
  - .5 List of Outstanding Shop Drawings.
  - .6 Change Orders.
  - .7 Other Modifications to Contract.
  - .8 Field Test Reports.
  - .9 Copy of Approved Work Schedule.
  - .10 Health and Safety Plan and Other Safety Related Documents.
  - .11 Other documents as specified.

## **1.8 PHASING REQUIRED**

- .1 The project is to commence two weeks after award, and must be substantial complete by no later than September 1, 2018. The project will be completed in two (2) sequential phases such that one (1) entrance ramp, and one (1) exit ramp will remain open at all times throughout the project. Testing and commissioning of the systems will be completed at the end of each phase. The proposed phasing is as follows:

- .1 Phase 1 – All Work on Donald Street Side: May 7, 2018 – June 22, 2018 (This is to be adjusted as required to accommodate the conclusion of the Jets hockey season)
  - .1 Ramp 6 – Donald Street Entrance Ramp to be completed first.
  - .2 Ramp 5 – Donald Street Exit Ramp to be completed second. Work on Ramp 5 is not to be initiated before Ramp 6 repairs are completed.
  - .3 Donald Street Mechanical Room
- .2 Phase 2 – All Work on Smith Street Side: June 25, 2018 – Aug 31, 2018
  - .1 Ramp 3 – Smith Street Exit Ramp
  - .2 Smith Street Mechanical Room

Should the Contractor wish to perform work within both mechanical rooms concurrently, alternate (overlapping) phasing may be proposed, provided that one (1) entrance ramp, and one (1) exit ramp still remain open at all times throughout the project.

All Pre-Construction activities including procurement of materials, labour, equipment, and sub-trades; shop drawing review; and confirming the extents of Concrete rehabilitation, should be completed by the Contractor in advance of May 7, 2018.

- .2 The following closure dates are to be incorporated into the construction schedule:
  - .1 Phase 1 May 7, 2018 – June 22, 2018. Phase 1 dates are to be adjusted to accommodate Jets Playoff Schedule. Should the Jets continue to play beyond May 7, 2018, the start date will be pushed back; however, the end date for the entire project will remain the same.
  - .2 Phase 2 – June 25, 2018 – Aug 31, 2018

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION 01 01 00**

**Part 1            General**

**1.1                USE OF SITE AND FACILITIES**

- .1        Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Contract Administrator to facilitate work as stated.
- .2        Maintain existing services to building and provide for personnel and vehicle access.
- .3        Where security is reduced by work provide temporary means to maintain security.
- .4        Contractor is to provide sanitary facilities for use by Contractor's personnel. Keep facilities clean.
- .5        Closures: protect work temporarily until permanent enclosures are completed.

**1.2                ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING**

- .1        Execute work with least possible interference or disturbance to building operations, public and normal use of premises. Arrange with Contract Administrator to facilitate execution of work.
- .2        Design, construct, and maintain temporary protection around areas of work within the existing structure.

**1.3                EXISTING SERVICES**

- .1        Refer to Section 01 10 05.

**1.4                SPECIAL REQUIREMENTS**

- .1        Ensure that Contractor personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .2        Keep within limits of work and avenues of ingress and egress.

**1.5                BUILDING SMOKING ENVIRONMENT**

- .1        Comply with the City's smoking restrictions.

**Part 2            Products**

**2.1                NOT USED**

- .1        Not Used.

**Part 3            Execution**

**3.1 NOT USED**

.1 Not Used.

**END OF SECTION 01 14 00**

**Part 1            General**

**1.1                REFERENCES**

- .1        The City of Winnipeg's General Conditions for Construction.

**1.2                CASH ALLOWANCES**

- .1        Include in Contract Price specified cash allowances.
- .2        Cash allowances, unless otherwise specified, cover net cost to Contractor of services, products, construction machinery and equipment, freight, handling, unloading, storage, installation and other authorized expenses incurred in performing Work.
- .3        Contract Price, and not cash allowance, includes Contractor's overhead and profit in connection with such cash allowance.
- .4        Contract Price will be adjusted by written order to provide for excess or deficit to each cash allowance.
- .5        Where costs under a cash allowance exceed amount of allowance, Contractor will be compensated for excess incurred and substantiated plus allowance for overhead and profit as set out in Contract Documents.
- .6        Include progress payments on accounts of work authorized under cash allowances in Contract Administrator's monthly certificate for payment.
- .7        Prepare schedule jointly with Contract Administrator and Contractor to show when items called for under cash allowances must be authorized by Contract Administrator for ordering purposes so that progress of Work will not be delayed.

**Part 2            Products**

**2.1                NOT USED**

- .1        Not Used.

**Part 3            Execution**

**3.1                NOT USED**

- .1        Not Used.

**END OF SECTION 01 21 00**

**Part 1 General**

**1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE**

- .1 Particular requirements for inspection and testing to be carried out by a testing laboratory approved by The City or Contract Administrator are specified under various sections.
- .2 The Contractors inspection and testing requirements are specified under various sections.

**1.2 APPOINTMENT AND PAYMENT**

- .1 The City will appoint and pay for services of testing laboratory for the following:
  - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
  - .2 Inspection and testing performed exclusively for Contractor's convenience.
  - .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
  - .4 Mill tests and certificates of compliance.
- .2 Where tests or inspections by a designated testing laboratory reveal work that is not in accordance with contract requirements, the Contractor shall pay costs for additional tests or inspections as required by The City or the Contract Administrator to verify acceptability of corrected work.

**1.3 CONTRACTOR'S RESPONSIBILITIES**

- .1 Provide labour, equipment and facilities to:
  - .1 Provide access to Work for inspection and testing.
  - .2 Facilitate inspections and tests.
  - .3 Make good Work disturbed by inspection and test.
  - .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
- .2 Notify The City sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by The City or the Contract Administrator.

**Part 2 Products**

**2.1 NOT USED**

.1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

.1 Not Used.

**END OF SECTION 01 29 83**

**Part 1      General**

**1.1      DESCRIPTION**

- .1      This Section specifies requirements for a detailed Construction Progress Schedule.

**1.2      REQUIREMENTS**

- .1      Prepare and submit a Construction Progress Schedule detailing Substantial Performance of the Work within the time period stated in the Contract.
- .2      Construction Progress Schedule to include dates for:
  - .1      Submission of Shop Drawings, material lists and samples.
  - .2      Mobilization on-site.
  - .3      Phase 1 Duration.
  - .4      Phase 2 Duration.
  - .5      Substantial Completion.
- .3      Co-ordinate and schedule the work to accommodate any restrictions to construction activities necessitated by The City.
- .4      Interim reviews of work progress based on work schedule will be conducted as decided by Contract Administrator and schedule updated by Contractor in conjunction with and to approval of Contract Administrator.

**1.3      FORMAT**

- .1      The Contractor shall submit initial schedule within (7) seven days after award of Contract and re-submit updated schedule with each application for payment.
- .2      Provide schedule in the form of a horizontal bar chart.
- .3      Provide a separate bar for each trade or operation.
- .4      Provide horizontal time scale identifying the first work day of each week.
- .5      Include the dates for the commencement and completion of each major elements of construction.
- .6      Updated schedule to show changes occurring since previous submission of schedule to include:
  - .1      Activities modified since previous submission.
  - .2      Revised projection of progress and completion.
  - .3      Modifications due to change orders.
  - .4      Other identifiable changes.
  - .5      Time will be the essence of the contract.

- .7 The Contract Administrator and Contractor will meet to review the proposed Work Schedule and the Contractor will make necessary changes until a satisfactory schedule is arrived at. Deviation from the approved schedule must be approved by the Contract Administrator.
- .8 The modified schedule, as approved in writing by the Contract Administrator required during the execution of the contract to reflect changes in the estimated quantity of work, shall form an integral part of the contract documents.

#### **1.4 SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00-Submittals.
- .2 Submit one opaque reproduction, plus two copies to be retained by the Contract Administrator.
- .3 Contract Administrator will review schedule and return reviewed copy within five days after receipt.

Distribute copies of the revised schedule to:

- .1 Job site office
  - .2 Subcontractors
  - .3 Other concerned parties
  - .4 The City
  - .5 Contract Administrator
- .4 Instruct recipients to report to the Contractor within 10 days, any problems anticipated by the timetable shown in the schedule.
  - .5 Include costs for execution, preparation and reproduction of schedule submittals in bid documents.

#### **1.5 QUALITY ASSURANCE**

- .1 Use experienced personnel, fully qualified in planning and scheduling to provide services from start of construction to Final Certificate, including Commissioning.

#### **1.6 PROJECT SCHEDULE REPORTING**

- .1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

**1.7 PROJECT MEETING**

- .1 Meet with Contract Administrator within 7 working days of Award of Contract date, to establish Scope of Work and approach to project construction operations.

**END OF SECTION 01 32 00**

**Part 1            General**

**1.1                DESCRIPTION**

- .1        This Section specifies the requirements for submittals of information by the Contractor for review by the Contract Administrator.
- .2        Additional specific requirements for submittals may also be included in individual Sections of Divisions 1 through 32.

**1.2                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        Make submittal submissions to Contract Administrator, with additional submissions to other parties involved with construction of the Project as directed by the Contract Administrator. Other parties may be one of the following, but shall not be restricted to, Contract Administrators, Authorities, The City, Contractors whose work must be coordinated with work related to submittals, or other organization as determined by the Contract Administrator.
- .3        Do not proceed with Work affected by submittal until review is complete.
- .4        Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .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        Review submittals prior to submission to the Contract Administrator. This review represents that necessary requirements have been determined and verified and that each submittal has been checked and coordinated with the requirements of the Work and the Contract Documents.
- .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's review.
- .10      Keep one reviewed copy of each submission on site.

### 1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .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 design drawings and specifications.
- .3 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.
- .4 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.
- .5 Accompany submissions with transmittal letter, in duplicate, containing:
  - .1 Date.
  - .2 Project title and number.
  - .3 Contractor's name and address.
  - .4 Identification and quantity of each shop drawing, product data and sample.
  - .5 Other pertinent data.
- .6 Submissions include:
  - .1 Date and revision dates.
  - .2 Project title and number.
  - .3 Name and address of:
    - .1 Contractor
    - .2 Subcontractor.
    - .3 Supplier.
    - .4 Manufacturer.
    - .5 Other pertinent detail.
  - .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.
- .7 After Contract Administrator's review, distribute copies.
- .8 Submit 3 prints and electronic copy (if available) of shop drawings for each requirement requested in specification Sections and as Contract Administrator may reasonably request.
- .9 Submit 3 prints or electronic copy (if available) 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.
- .10 Submit 3 prints or electronic copy 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 and must conform to all current applicable code requirements.
- .11 Submit 3 prints or electronic copy 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.
- .12 Submit 3 prints or electronic copy 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 Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .13 Submit 3 prints or electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Contract Administrator.
  - .1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .14 Submit 3 prints or electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested Contract Administrator.

- .15 Delete information not applicable to project.
- .16 Supplement standard information to provide details applicable to project.
- .17 If upon review by Contract Administrator, no errors or omissions are discovered, copies 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.
- .18 Review of shop drawings prior to submission to the Contract Administrator. Review of shop drawings is for sole purpose of ascertaining conformance with general concept. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with the requirements of the work and the Contract Documents. 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 all sub-trades.
- .19 Resubmit immediately Drawings noted "see comments" if requested by the Contract Administrator, to ensure that corrections have been made.
- .20 Drawings requiring resubmissions to be either corrected or resubmitted or to be superseded by other submitted Drawings.
- .21 Do not make any changes to Shop Drawings after final review without written permission of the Contract Administrator.
- .22 Where necessary and required, shop drawings to be stamped and signed by a professional engineer licensed in the province of Manitoba.

#### **1.4 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.
- .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.

**1.5 CERTIFICATES AND TRANSCRIPTS**

- .1 Immediately after award of Contract, submit Clearance Certificate from the WCB. Submit transcription of insurance immediately after award of Contract.
- .2 Submit transcriptions of insurance immediately after award of Contract.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION 01 33 00**

**Part 1            General**

**1.1                SUMMARY**

- .1            This section specifies requirements for traffic control procedures required for this project.

**1.2                PROTECTION OF PUBLIC TRAFFIC**

- .1            Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.
- .2            When working on travelled way:
  - .1            Place equipment in position to present minimum of interference and hazard to traveling public.
  - .2            Keep equipment units as close together as working conditions permit and preferably on same side of traveled way.

**1.3                INFORMATIONAL AND WARNING DEVICES**

- .1            Provide and maintain signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting.
- .2            Supply and erect signs, delineators, barricades and miscellaneous warning devices as required.
- .3            Meet with Contract Administrator prior to commencement of Work to prepare list of signs and other devices required for project.
- .4            Continually maintain traffic control devices in use by:
  - .1            Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.
  - .2            Removing or covering signs which do not apply to conditions existing from day to day.

**1.4                OPERATIONAL REQUIRMENTS**

- .1            Maintain existing conditions for traffic throughout period of contract except that, when required for construction under contract and when measures have been taken and approved by Contract Administrator to protect and control public traffic, existing conditions for traffic to be restricted.
- .2            Maintain existing conditions for traffic crossing right-of-way.
- .3            Maintain existing conditions for traffic crossing right-of-way except when required for construction. With approval of Contract Administrator, existing conditions for cross traffic to be restricted.

**Part 2            Products**

**2.1                NOT USED**

.1            Not used.

**Part 3            Execution**

**3.1                NOT USED**

.1            Not used.

**END OF SECTION 01 35 14**

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**Part 1            General**

**1.1                DESCRIPTION**

- .1            This Section specifies requirements for safety measures at the job site.

**1.2                CONSTRUCTION SAFETY MESURES**

- .1            Observe and enforce construction safety measures required by National Building Code, The Workplace Safety and Health Act, and Regulations for Construction Projects, Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations – made under the Workplace Safety and Health Act, Workers’ Compensation Board and municipal statutes, authorities, and Workplace Hazardous Materials Information System (WHMIS).
- .2            In the event of conflict between ay provisions of above authorities, the most stringent provisions will apply.
- .3            Where applicable, the Contractor shall be designated the “Constructor”, as defined by the Workers Compensation Board of Manitoba (WCB).
- .4            Notify the Workplace Safety and Health Branch before commencing work on this project as required by the regulations.
- .5            The Contractor shall follow the Workplace Safety and Health Branch requirements for avoiding Carbon Monoxide poisoning in enclosed and semi enclosed worksites.

**1.3                FIRE PROTECTION**

- .1            Provide and maintain temporary fire protection equipment during performance of the Work required by insurance companies having jurisdiction and governing codes, regulations and by-laws and municipal fire prevention authorities.
- .2            Act as fire warden. Maintain fire protection and enforce proper fire prevention practices.

**1.4                OVERLOADING**

- .1            Ensure no party of work is subjected to a load which will endanger its safety or will cause permanent deformation. The load shall not exceed the 2.4 kPa design live load for all suspended slabs.

**1.5                FALSEWORK**

- .1            If required, design and construct falsework in accordance with CSA S269.1.

**1.6                SCAFFOLDING**

- .1            Design and construct scaffolding in accordance with CAN/CSA-S269.2.

**1.7 MATERIALS ON SITE**

- .1 Comply with WHMIS requirements regarding all materials stored on site. Submit Material Safety Data Sheets to Contract Administrator prior to shipping materials.
- .2 Contractor shall have a complete set of unexpired Material Safety Data Sheets (MSDSs) for all WHMIS controlled products on site. These MSDSs must be available on site for the Contractor's personnel.
- .3 Label all containers of controlled products in accordance with WHMIS regulations.
- .4 Where WHMIS controlled products are used, all of the Contractor's personnel are required to be trained in the safe use, handling, storage, and disposal of those products.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION 01 35 30**

**Part 1            General**

**1.1                REFERENCE STANDARDS**

- .1    Canadian Construction Documents Committee (CCDC)
  - .1        CCDC 2-[2008], Stipulated Price Contract.

**1.2                INSPECTION**

- .1    Refer to CCDC 2, GC 2.3.
- .2    Allow Contract Administrator access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .3    Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Contract Administrator, or law of Place of Work.
- .4    If Contractor covers or permits to be covered 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.
- .5    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.

**1.3                INDEPENDENT INSPECTION AGENCIES**

- .1    Independent Inspection/Testing Agencies will be approved by Contract Administrator for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the Contractor.
- .2    Allocated costs: to Section 01 21 00 - Allowances.
- .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 Contract Administrator or City. Pay costs for re-testing and re-inspection.

**1.4                ACCESS TO WORK**

- .1    Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2    Co-operate to provide reasonable facilities for such access.

## **1.5 PROCEDURES**

- .1 Notify appropriate agency and Contract Administrator 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.

## **1.6 REJECTED WORK**

- .1 Refer to CCDC, GC 2.4.
- .2 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.
- .3 Make good other Contractor's work damaged by such removals or replacements promptly.
- .4 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.

## **1.7 REPORTS**

- .1 Submit [4] copies of inspection and test reports to Contract Administrator.
- .2 Provide copies to manufacturer or fabricator of material being inspected or tested. Provide copies to subcontractor of work being inspected or tested.

## **1.8 TESTS AND MIX DESIGNS**

- .1 Furnish test results and mix designs as requested.
- .2 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.

## **1.9 MOCK-UPS**

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Contract Administrator.
- .3 Prepare mock-ups for Contract Administrator review with reasonable promptness and in orderly sequence, to not cause delays in Work.

- .4 Failure to prepare mock-ups 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.
- .5 If requested, Contract Administrator will assist in preparing schedule fixing dates for preparation.
- .6 Remove mock-up at conclusion of Work or when acceptable to Contract Administrator.
- .7 Mock-ups may remain as part of Work.
- .8 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

**1.10 MILL TESTS**

- .1 Submit mill test certificates as requested of specification Sections.

**1.11 EQUIPMENT AND SYSTEMS**

- .1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION 01 45 00**

**Part 1            General**

**1.1                REFERENCE STANDARDS**

- .1    Canadian Construction Documents Committee (CCDC)
  - .1        CCDC 2, Stipulated Price Contract.
- .2    Canadian General Standards Board (CGSB)
  - .1        CAN/CGSB 1.189, Exterior Alkyd Primer for Wood.
  - .2        CGSB 1.59, Alkyd Exterior Gloss Enamel.
- .3    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-0121, Douglas Fir Plywood.
  - .3        CAN/CSA-S269.2, Access Scaffolding for Construction Purposes.
  - .4        CAN/CSA-Z321, Signs and Symbols for the Occupational Environment.

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

**1.3                INSTALLATION AND REMOVAL**

- .1    Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2    Identify areas which have to be gravelled to prevent tracking of mud.
- .3    Indicate use of supplemental or other staging area.
- .4    Provide construction facilities in order to execute work expeditiously.
- .5    Remove from site all such work after use.

**1.4                SCAFFOLDING**

- .1    Scaffolding in accordance with CAN/CSA-S269.2.
- .2    As required for the execution of the work, provide and maintain temporary stairs, platforms, scaffolding, ladders, and ramps.

**1.5                HOISTING**

- .1    Provide, operate and maintain hoists as required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.
- .2    Hoists to be operated by qualified operator.

**1.6 SITE STORAGE/LOADING**

- .1 Refer to CCDC 2, GC 3.12.
- .2 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .3 Do not load or permit to load any part of Work with weight or force that will endanger Work.

**1.7 CONSTRUCTION PARKING**

- .1 Contractors are required to pay for parking on-site. The costs of parking on-site should be included their overhead.
- .2 Provide and maintain adequate access to project site.
- .3 Clean runways and taxi areas where used by Contractor's equipment.

**1.8 SECURITY**

- .1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

**1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE**

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

**1.10 SANITARY FACILITIES**

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

**1.11 CONSTRUCTION SIGNAGE**

- .1 Provide and erect project sign, within three weeks of signing Contract, in a location designated by the City.
- .2 Indicate on sign, name of Contractor and Contract Administrator, of design style approved by Contract Administrator.
- .3 No other signs or advertisements, other than warning signs, are permitted on site.
- .4 Locate project identification sign as directed by the City.
- .5 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .6 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or earlier if directed by Contract Administrator.

**1.12 PROTECTION AND MAINTENANCE OF TRAFFIC**

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period.
- .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .4 Protect travelling public from damage to person and property.
- .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
- .7 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .8 Dust control: adequate to ensure safe operation at all times.
- .9 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
- .10 Provide snow removal during period of Work.

**1.13 CLEAN-UP**

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used

**END OF SECTION 01 52 00**

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**Part 1            General**

**1.1                REFERENCES**

- .1        Work shall conform to the requirements of the National Building Code and all amendments and all local, Municipal and Provincial building by-laws and ordinances.

**1.2                INSTALLATION AND REMOVAL**

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

**1.3                HOARDING**

- .1        Erect temporary site enclosures using as indicated on the drawings.
- .2        Provide lockable truck entrance gate and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.
- .3        As directed, erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.
- .4        Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

**1.4                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.

**1.5                ACCESS TO SITE**

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

**1.6                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.

**1.7                FIRE ROUTES**

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

**1.8                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.

**1.9 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 Be responsible for damage incurred due to lack of or improper protection.
- .4 Additional specific attention has been requested of the Contractor, by the City, to ensure the preservation and protection of the traffic coating in the garage throughout the course of all work performed under this Contract.

**1.10 WASTE MANAGEMENT AND DISPOSAL**

- .1 Refer to section 01 74 21.

**Part 2 Products**

**2.1 Not Used**

- .1 Not Used.

**Part 3 Execution**

**3.1 Not Used**

- .1 Not Used.

**END OF SECTION 01 56 00**

**Part 1            General**

**1.1                DUST TIGHT SCREENS**

- .1        Provide and maintain a temporary dust partition between the work area and the remainder of the building during the period of construction as required.

**1.2                PROJECT CLEANLINESS**

- .1        Maintain the work in tidy condition, free from accumulation of waste products and debris.
- .2        Remove waste material and debris from the site in timely matter.

**1.3                FINAL CLEANING**

- .1        When the Work is Substantially Performed, remove surplus products, tools, construction, machinery and equipment not required for the performance of the remaining work.
- .2        Remove waste products and debris other than that caused by the City or their employees, and leave the site clean and suitable for the use of the City and future renovation work.
- .3        When the Work is Totally Performed, remove surplus products, tools, construction machinery and equipment. Remove waste products and debris other than that caused by the City.
- .4        Remove waste materials from the site at regularly scheduled times. Do not burn waste materials on site.
- .5        Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .6        Leave the work broom clean before the inspection process commences.
- .7        Remove dirt and other disfiguration from exterior surfaces.
- .8        Sweep and wash clean paved areas.
- .9        Wash windows and frames affected by the work.

**Part 2            Products**

**2.1                NOT USED**

- .1        Not used.

**Part 3            Execution**

**3.1                NOT USED**

.1                Not used.

**END OF SECTION 01 74 12**

**Part 1            General**

**1.1                STORAGE, HANDLING AND PROTECTION**

- .1    Store materials to be reused, recycled and salvaged in locations as directed by Contract Administrator.
- .2    Unless specified otherwise, materials for removal do not become Contractor's property.
- .3    Protect, stockpile, store and catalogue salvaged items.
- .4    Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5    Protect structural components not removed for demolition from movement or damage.
- .6    Support affected structures. If safety of building is endangered, cease operations and immediately notify Contract Administrator.
- .7    Protect surface drainage, mechanical and electrical from damage and blockage.
- .8    Separate and store materials produced during dismantling of structures in designated areas.
- .9    Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
  - .1    On-site source separation is recommended.
  - .2    Remove co-mingled materials to off-site processing facility for separation.
  - .3    Provide waybills for separated materials.

**1.2                DISPOSAL OF WASTES**

- .1    Do not bury rubbish or waste materials.
- .2    Do not dispose of waste into waterways, storm, or sanitary sewers.
- .3    Remove materials from deconstruction as deconstruction/disassembly Work progresses.

**1.3                USE OF SITE AND FACILITIES**

- .1    Execute work with least possible interference or disturbance to normal use of premises.

**1.4                SCHEDULING**

- .1    Coordinate Work with other activities at site to ensure timely and orderly progress of Work.

**Part 2            Products**

2.1            **NOT USED**

- .1            Not Used.

**Part 3            Execution**

3.1            **CLEANING**

- .1            Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
- .2            Clean-up work area as work progresses.

**END OF SECTION 01 74 21**

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**Part 1            General**

**1.1                ADMINISTRATIVE REQUIREMENTS**

- .1    Demonstrate scheduled operation and maintenance of equipment and systems to Contract Administrator's personnel two weeks prior to date of final inspection.
- .2    Contract Administrator will provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.
- .3    Preparation:
  - .1    Verify conditions for demonstration and instructions comply with requirements.
  - .2    Verify designated personnel are present.
  - .3    Ensure equipment has been inspected and put into operation.
  - .4    Ensure testing, adjusting, and balancing has been performed and equipment and systems are fully operational.
- .4    Demonstration and Instructions:
  - .1    Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing and maintenance of each item of equipment, at the equipment location
  - .2    Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
  - .3    Review contents of manual in detail to explain aspects of operation and maintenance.
  - .4    Prepare and insert additional data in operations and maintenance manuals when needed during instructions.
- .5    Time Allocated for Instructions:
  - .1    For each training session, allow full 8-hour day for instruction and training.

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2    Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Contract Administrator's approval.
- .3    Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .4    Give time and date of each demonstration, with list of persons present.
- .5    Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

**1.3                QUALITY ASSURANCE**

- .1    When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:
  - .1    Instruct Contract Administrator's personnel.

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.2 Provide written report that demonstration and instructions have been completed.

**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                REFERENCES**

.1            Standard Specifications (latest edition) except where modified by this section or the Contract Drawings, the specifications listed below shall govern:

- .1            Canadian Environmental Assessment Act (CEAA), 2012.
- .2            CSA Standard S350 Code Practice for Safety in Demolition of Structures
- .3            CSA Z797-09 Code Practice for Access Scaffold

**1.2                PROTECTION**

- .1            Prevent movement, settlement or damage of adjacent structures, services, walks, paving, trees, landscaping, adjacent grades. Provide bracing, shoring as required. Repair damage caused by demolition as directed by the Contract Administrator.
- .2            Support affected columns and adjacent floor structure and, if safety of structure being demolished or adjacent structures or services appears to be endangered, take preventative measures and then cease operations and notify the Contract Administrator.
- .3            Prevent debris from blocking surface drainage system, mechanical and electrical systems which must remain in operation.
- .4            Do not dispose of waste or volatile materials such as: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers. Ensure proper disposal procedures are maintained throughout project.
- .5            Do not pump water containing suspended materials into storm or sanitary sewers or onto adjacent properties.
- .6            Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.
- .7            Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.
- .8            Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all affected levels.

**1.3                SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 – Submittals.
- .2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets if required.
- .3 Shop drawings:
  - .1 Submit for approval drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, where required by authorities having jurisdiction.
  - .2 Submit drawings stamped and signed by qualified professional engineer registered or licensed in Province of Manitoba, Canada.
- .4 Hazardous Materials: provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.

#### 1.4 **REGULATORY REQUIREMENTS**

- .1 Ensure work is performed in compliance with CEAA, and all applicable provincial regulations.

#### 1.5 **DEFINITIONS**

- .1 Demolition: rapid destruction of building following removal of hazardous materials.
- .2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.

#### 1.6 **SCHEDULING**

- .1 Ensure project time lines are met without compromising specified minimum rates of material diversion. Notify Contract Administrator in writing of delays.

### **Part 2 Products**

#### 2.1 **GENERAL**

- .1 Equipment and heavy machinery to meet or exceed all applicable emission requirements.
- .2 If fuel burning equipment is being used during demolition; the Contractor shall follow the Workplace Safety and Health Branch recommended precautions for carbon monoxide poisoning in enclosed or semi enclosed areas.

- .3 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

**Part 3 Execution**

**3.1 PREPARATION**

- .1 Disconnect and re-route electrical lines affected by the demolition. Post warning signs on electrical lines and equipment, which must remain energized to serve other properties during period of demolition.
- .2 Do not disrupt active or energized utilities traversing premises designated to remain undisturbed.

**3.2 SAFETY CODE**

- .1 Do demolition work in accordance with CSA Standard S350 Code Practice for Safety in Demolition of Structures.

**3.3 REMOVAL OF HAZARDOUS WASTES**

- .1 Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

**3.4 DEMOLITION**

- .1 Demolish parts of structure in accordance with approved schedule and construction phasing option.
- .2 Stockpile materials as directed by the Contract Administrator. Eliminate double handling where possible.
- .3 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as work progresses.
- .4 At end of each day's work, leave work in safe and stable condition.
- .5 Removal from site:
  - .1 Remove stockpiled material as directed by the Contract Administrator, when it interferes with operations of project construction. Supply separate, clearly marked disposal bins for categories of waste material.

- .2 Remove stockpiles of like materials by an alternate disposal option once collection of materials is complete.
- .3 Transport material designated for alternate disposal using approved haulers and receiving organizations in accordance with applicable regulations.
- .4 Written authorization from the Contract Administrator is required to deviate from haulers and receiving organizations.
- .5 Ensure that these materials will not be disposed of in landfill or waste stream destined for landfill. Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
- .6 Remove and dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.

### 3.5 **SALVAGE AND PROTECTION**

- .1 Salvage and protect items noted on drawings.
- .2 Dismantle items containing materials for salvage and stockpile salvaged materials at locations as directed by the Contract Administrator.

### 3.6 **ARCHITECTURAL COATING REMOVAL**

- .1 Remove architectural coating on select areas of the exterior wall surfaces on ramp 3, 5 and 6 and as indicated on the drawings, and specified by the Contract Administrator.
- .2 Remove coating using suitable means so as not damage existing concrete surfaces.

### 3.7 **RESTORATION**

- .1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work and match condition of adjacent, undisturbed areas.

### 3.8 **CLEANING**

- .1 Remove debris, trim surfaces and leave work site clean, upon completion of Work
- .2 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

**END OF SECTION 02 22 20**

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**PART 1      General**

**1.1            REFERENCE STANDARDS**

- .1      Design, construction and removal of falsework and formwork to CSA A23.1, except as amended or extended herein.
- .2      Do falsework in accordance with CSA S269.1, except where specified otherwise.
- .3      Do formwork in accordance with CAN/CSA-S269.3.

**1.2            DEFINITION**

- .1      Architectural concrete: all formed surfaces exposed to view in the completed structure.

**1.3            DESIGN REQUIREMENTS**

- .1      The Contractor shall provide shoring to support all anticipated loads including, but not limited to, dead loads, construction live loads and lateral earthquake and wind loads.
- .2      The shoring design shall take into account all unbalanced loads due to construction sequencing.

**1.4            SHOP DRAWINGS**

- .1      Submit Shop Drawings in accordance with Section 01 33 00 – Submittals.
- .2      The Shop Drawings shall include detail drawings and design calculations of falsework and formwork for columns, beams, slabs and concrete walls.
- .3      The detail drawings and design calculations for falsework and formwork shall bear the signature and stamp of a professional engineer licensed in the Province of Manitoba, and experienced in formwork design.

**1.5            CERTIFICATION OF INSPECTION**

- .1      The professional engineer, whose signature and seal appear on the Construction Procedure Drawings, shall inspect the work, and certify in writing that the formwork and falsework are in accordance with calculations and Drawings reviewed by the Contract Administrator.
- .2      Submit such certification to the Contract Administrator before placing concrete.

**1.6            DELIVERY, STORAGE, AND PROTECTION**

- .1      Deliver, handle and store formwork materials and accessories to prevent weathering, warping or damage detrimental to the strength of the materials or to the surfaces to be formed.

- .2 Ensure that formwork surfaces which will be in contact with concrete are not contaminated by foreign matter.
- .3 Handle and erect the fabricated formwork to prevent damage.

## **PART 2 Products**

### **2.1 MATERIALS**

- .1 General: materials shall conform to the requirements of CSA A23.1, except as amended or extended herein.
- .2 Formwork lumber: plywood and wood formwork materials to CSA O121, CSA O86.1.
- .3 Falsework materials: to CSA S269.1.
- .4 Chamfers shall be formed by suitably shaped wood or pre-moulded elements secured in the forms.
- .5 Form ties:
  - .1 Construct ties so that when end fasteners of ties are removed, no metal shall be within 50 mm of formed faces of concrete.
  - .2 Ties shall have a minimum working strength of 15 kN.
- .6 Form release agent: chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing concrete from sticking to forms. Use "Crete-lease 727" manufactured by Cresset, "Sealtight Duogard Form Release Agent" manufactured by W. R. Meadows, or Contract Administrator-approved equal.

## **PART 3 Execution**

### **3.1 PREPARATION**

- .1 Do not allow form release agent to come in contact with hardened concrete against which fresh concrete is to be placed, or where waterproofing, floor finishes, paint, etc., are applied directly to finished concrete surfaces. Remove with approved solvents any form coating which contacts reinforcing steel.

### **3.2 ERECTION**

- .1 Verify lines, levels and column centres before proceeding with formwork and ensure that dimensions agree with Drawings.
- .2 Construct falsework in accordance with CSA S269.1.
- .3 Construct forms to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA A23.1.

- .4 Obtain Contract Administrator's permission before framing openings not indicated in concrete joists, beams or columns.
- .5 Align form joints and make watertight. Keep form joints to minimum.
- .6 Locate horizontal form joints for exposed columns 2400 mm above finished floor elevation.
- .7 Use 20 mm chamfer strips on external corners of beams, joists and columns.
- .8 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .9 Inspect and check the completed formwork and falsework to ensure that the work is in accordance with the shop drawings and design calculations, and that they are properly placed, rigid and secure, before placing concrete. The engineer responsible for the design of formwork and falsework shall also inspect this work.
- .10 Inspect forms immediately prior to placing concrete. Remove any loose metal ties, chairs, wood or other foreign material. Ensure that reinforcement, ties, inserts, anchors, etc., are clear of the forms.
- .11 Clean formwork in accordance with CAN/CSA-S269.3.
- .12 Removal of forms and falsework shall be based on the test results and condition of concrete. If, in the opinion of the Contract Administrator, removal of forms is likely to endanger whole or part of the structure, forms and falsework shall remain in place until stability is ensured.
- .13 Exercise care in removing forms for concrete so that edges, corners, etc. are not damaged.
- .14 Re-use of falsework and formwork subject to requirements of CSA S269.1. Do not re-use formwork if there is any evidence of surface wear or defect which would impair concrete surface quality.
- .15 Patch tie holes and defects with grout to match adjacent concrete in texture and colour, remove fins, thoroughly clean and coat forms, to approval of Contract Administrator, before reusing.

**END OF SECTION 03 10 00**

**PART 1      General**

**1.1          REFERENCE STANDARDS**

- .1 Do reinforcing work in accordance with CSA A23.1, and welding of reinforcing with CSA W186, except where specified otherwise.

**1.2          SOURCE QUALITY CONTROL**

- .1 Provide Contract Administrator with certified copy of Mill Test Report of reinforcing steel, showing physical and chemical analysis, minimum five weeks prior to commencing reinforcing work.
- .2 Inform Contract Administrator of proposed source of material to be supplied.

**1.3          SHOP DRAWINGS**

- .1 Submit Shop Drawings in accordance with Section 01 33 00 – Submittals.
- .2 Shop Drawings shall include the following:
  - .1 Reinforcing placing Drawings to minimum scale of 1:100, showing size, location spacing and identification of all bars, and outline of all concrete surrounding steel, drawn to scale. Drawings shall show openings required for mechanical, electrical and other services, dimensioned and related to suitable grid line or elevation data.
  - .2 Bar lists showing all detailed dimensions, number of bars, size and location, prepared in accordance with recommendations of "Reinforcing Steel Manual of Standard Practice" by Reinforcing Steel Institute of Canada.
  - .3 Shop drawings shall bear the signature and stamp of a professional engineer licensed in the province of Manitoba, Canada.

**1.4          DELIVERY AND STORAGE**

- .1 Deliver, handle and store reinforcing accessories in accordance with CSA A23.1.

**PART 2      Products**

**2.1          MATERIALS**

- .1 Reinforcing steel: new billet steel, grade 400 R or 400 W, deformed bars to CAN/CSA-G30.18.
- .2 Where specified on drawings: Epoxy coated reinforcing steel shall be new billet steel, grade 400 R or 400 W, deformed bars to CAN/CSA-G30.18. Epoxy coating to ASTM A 775.
- .3 Cold-drawn annealed steel wire ties: to CSA G30.3, minimum diameter 1.2 mm (18 ga).

- .4 Chairs, bolsters, bar supports, spacers: to CSA A23.1. Chairs used to support bars in slabs shall be made from non-ferrous metal or other non-staining material.
- .5 Mechanical splices: tapered threaded couplers, use "Lenton Rebar Splicing System" by Erico Products Inc., or Contract Administrator-approved equal.
- .6 Plain round bars: to CSA G40.21.

## **2.2 FABRICATION**

- .1 Fabricate reinforcing in accordance with CSA A23.1, and "Reinforcing Steel Manual of Standard Practice" by the Reinforcing Steel Institute of Canada.
- .2 Provide lapped splice lengths as shown in the reinforcing lap length table on the shop drawings.
- .3 Obtain Contract Administrator's approval for locations of reinforcement splices other than shown on placing drawings.
- .4 Upon approval of Contract Administrator, weld reinforcement in accordance with CSA W186.
- .5 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

## **2.3 INSPECTION AND TESTING**

- .1 Tests on reinforcing steel shall be by an independent inspection company.
- .2 A series of specimens for each grade and size of reinforcing steel contained in any of 100 tonnes of steel shipped may be tested.
- .3 A series of tests will include two bars for each test required of each size and grade of steel used. Reinforcing steel tests will be made in accordance with CAN/CSA-G30.18.

## **PART 3 Execution**

### **3.1 FIELD BENDING**

- .1 Do not field bend reinforcement except where authorized by Contract Administrator.
- .2 When field bending is authorized, bend without heat, applying a slow and steady pressure.
- .3 Replace bars which develop cracks or splits.

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**3.2 PLACING REINFORCEMENT**

- .1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CSA A23.1.
- .2 Tack-welding of crossing bars and welding of pipe supports to reinforcing bars will not be permitted, unless approved by the Contract Administrator.
- .3 Concrete support blocks may be used to support bottom reinforcing steel in slabs and footings resting on working slabs or ground. Blocks shall be suitably tapered to ensure a permanent key with finished structure.
- .4 Top steel in slab shall be supported on high chairs. Beam and slab steel in suspended concrete structures shall be supported and tied to chairs.
- .5 Prior to placing concrete, notify the Contract Administrator for the purpose of reviewing reinforcing steel in place. In the case of a wall, notify the Contract Administrator prior to closing in wall forms.

**3.3 FIELD TOUCH-UP**

- .1 Touch up damaged and cut ends of epoxy-coated reinforcing steel with compatible finish to provide continuous coating.

**END OF SECTION 03 20 00**

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**Part 1            General**

**1.1                REFERENCES**

- .1    Except where modified by this section or the Contract Drawings, the standard specifications (latest edition) listed below shall govern:
  - .1    CAN3-A23.1 Concrete Materials and Methods of Construction
  - .2    CAN/CSA S413 Parking Structures
  - .3    CAN3-A266.4 Guidelines for Use of Admixtures in Concrete
  - .4    CAN/CSA-A23.5 Supplementary Cementing Materials

**1.2                DESIGN REQUIREMENTS**

- .1    In accordance with CSA-A23.1/A23.2 and to the requirements in Part 2 - Products.

**1.3                SUBMITTALS**

- .1    Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2    The mix design shall be submitted in accordance with the MRMCA and shall include a breakdown of the constituent components for each mix.
- .3    Submit testing results and reports for review Contract Administrator and do not proceed without written approval when deviations from mix design or parameters are found.
- .4    Concrete pours: submit accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in Part 3-Field Quality Control.
- .5    Concrete hauling time: submit for review Contract Administrator deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

**1.4                QUALITY ASSURANCE**

- .1    Submit to Contract Administrator, minimum 4 weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.
  - .1    When plant does not hold valid certification, provide test data and certification by qualified independent inspection and testing laboratory that materials used in concrete mixture will meet specified requirements.

**1.5                DELIVERY, STORAGE AND HANDLING**

- .1    Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.
  - .1    Modifications to maximum time limit must be agreed to 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.
- .3 Waste Management and Disposal:
  - .1 Separate waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **Part 2 Products**

### **2.1 MATERIALS AND MIXES**

- .1 Cement: to CAN/CSA-A3001, Type 10.
- .2 Water: to CSA-A23.1.
- .3 Aggregates: to CAN/CSA-A23.1/A23.2.

### **2.2 CONCRETE**

- .1 Concrete materials, procedures, tolerances and workmanship shall conform to the latest issue of CSA A23.1 and A23.2.
- .2 Concrete for Heated Ramp Topping: to CAN3-A23.1, exposure Class: C-1, unless modified herein. Use type 10 cement to give minimum compressive strength of 35 MPa in 28 days with 10mm nominal aggregate size, 7.5%+1.5% entrained air.
- .3 Polypropylene Fiber: 2.27 Kgs/m of MAC 100 Plus Macro Synthetic or approved equivalent.
- .4 Unless otherwise specified: Concrete to conform to CAN3-A23.1, exposure Class: C-1, unless modified herein. Use type 10 cement to give minimum compressive strength of 35 MPa in 28 days with 20mm nominal aggregate size and 6.5%+1.5% entrained air.

### **2.3 ADMIXTURES**

- .1 Concrete admixtures shall be compatible with one another, and used in accordance with manufacturer's instructions, and CAN3-A266.4, "Guidelines for Use of Admixtures in Concrete".
- .2 Air entraining admixture: to ASTM C260.
- .3 Corrosion-inhibiting admixture shall be CATEXOL 1000 CI as manufactured by Axim Italcementi Group or approved equivalent. The minimum dosage shall be 15 L/m<sup>3</sup> in accordance to the manufacturer's instructions and recommendation of Appendix C Corrosion Inhibitors-CAN/CSA 2413 M94.

## **Part 3 Execution**

### **3.1 PREPARATION**

- .1 Obtain Contract Administrator's approval before placing concrete. Provide 24 hours notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing and as directed by Contract Administrator.
- .3 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.
- .4 Pumping of concrete is permitted only after approval of equipment and mix.
- .5 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .6 Prior to placing of concrete obtain Contract Administrator's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .7 Protect previous Work from staining.
- .8 Clean and remove stains prior to application for concrete finishes.
- .9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .10 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.
  - .1 Place steel dowels of deformed steel reinforcing bars and pack solidly with non shrink grout to anchor and hold dowels in positions as directed by Contract Administrator.
- .11 Do not place load upon new concrete until authorized by Contract Administrator.

### **3.2 CONSTRUCTION**

- .1 Do cast-in-place concrete work in accordance with CSA-A23.1/A23.2.
- .2 Sleeves and inserts:
  - .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by Contract Administrator.
  - .2 Where approved by Contract Administrator, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
  - .3 Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by Contract Administrator.

- .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Contract Administrator before placing of concrete.
  - .5 Check locations and sizes of sleeves and openings shown on drawings.
  - .6 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
- .3 Anchor bolts:
- .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
  - .2 With approval of Contract Administrator grout anchor bolts in preformed holes or holes drilled after concrete has set, and as directed by Contract Administrator.
  - .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
  - .4 Set bolts and fill holes with shrinkage compensating grout epoxy grout.
  - .5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.
- .4 Finishing and curing:
- .1 Finish concrete in accordance with CSA-A23.1/A23.2 and as directed by Contract Administrator.
  - .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 Curing compounds are not permitted.
  - .4 Finish concrete floor to meet requirements of CSA-A23.1/A23.2.
  - .5 Provide finish as directed by Contract Administrator.
  - .6 Provide steel trowelled finish unless otherwise indicated.
- .5 Toppings:
- .1 Topping: as thick as indicated by Contract Administrator.
  - .2 In pouring base course, make allowance for topping thickness where indicated on drawings.
  - .3 Place topping in accordance with CSA-A23.1.
  - .4 Concrete topping for heated ramps shall receive a rough broom finish.
- .6 Joint fillers:
- .1 Furnish 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 Install joint filler.

- .5 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.

### **3.3 SURFACE TOLERANCE**

- .1 Concrete tolerance in accordance with CSA-A23.1/A23.2 straightedge method.

### **3.4 FIELD QUALITY CONTROL**

- .1 Inspection and testing of the concrete and concrete material will be carried out by a designated testing laboratory and in accordance with CAN/CSA A23.1 and as directed by the Contract Administrator.
- .2 Number and frequency of cylinder tests taken shall be as follows: two 28-day and one 7-day test specimen taken for each 50 cubic metres of concrete, or fraction thereof, for each class of concrete cast. Frequency of slump and air content tests shall be determined by the Contract Administrator.
- .3 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory approved by Contract Administrator for review in accordance with CSA-A23.1/A23.2. Ensure testing laboratory is certified in accordance with CSA A283.
- .4 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and the Contract Administrator.
- .5 Contractor will pay for costs of tests as specified in Section 01 29 83 - Payment Procedure: Testing Laboratory Services.
- .6 Non-Destructive Methods for Testing Concrete: in accordance with CSA-A23.1/A23.2.
- .7 Inspection or testing by Contract Administrator will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

**END OF SECTION 03 30 00**

**Part 1            General**

**1.1                SCOPE OF WORK**

- .1        Supply all labour, plant, tools, equipment and materials necessary to carry out injection of all leaking cracks in the exposed concrete perimeter wall and slab concrete as specified.

**1.2                APPROVALS**

- .1        The products listed in Clause 2.1 of this specification Section are approved for use on this project. If the Contractor or subcontractor responsible for the crack injection is aware that any of the products listed in Clause 2.1 do not meet the requirements as listed, then the Contractor shall advise the Contract Administrator in writing during the tender and the Contract Administrator will instruct the Contractor on procedure. If no such written document is submitted then it will be accepted that the Contractor warrants that any product used meets the requirement of the specifications and application.
- .2        Obtain Contract Administrators written approval prior to use of any crack injection product not specifically listed in this section. Proposals for use of alternate products will be considered; however, the stipulated price submitted must include one of the approved systems and shall show the alternate systems as a separate price.

**1.3                SUBMISSION AND DESIGN REQUIREMENTS**

- .1        The Contractor shall submit two copies of manufacturer's specifications for all products incorporated into the crack injection process.

**1.4                MATERIAL AND INSTALLATION REQUIREMENTS**

- .1        The spacing of the injection ports shall be designed to achieve full depth penetration of the cracks.
- .2        The temperature of the exterior concrete and the ambient temperature shall be a minimum of 5°C during preparation injection and curing.
- .3        All installation procedures and details shall be completed in full accordance with manufacturer's instructions.
- .4        Where details shown on the drawings or in the specification are not in accordance with manufacturers requirements, notify Contract Administrator.

**1.5                RELATED BY-LAWS AND STANDARD SPECIFICATIONS**

- .1        Work shall conform to the requirements of the Manitoba Building Code (latest edition) and all amendments and all local, municipal and provincial building by-laws and ordinances.

- .2 Except where modified by this section or the Contract Drawings, the specifications (latest edition) listed below shall govern.

## **1.6 SURFACE COATINGS**

- .1 After completion of crack injection, all surface coatings, including paint, waterproofing membrane, sealers, etc. shall be reinstated.
- .2 All new surface coatings shall be of colour and texture to blend into the existing building surface to highest degree possible.
- .3 Contractor to include cost of surface coating reinstatement in unit prices for concrete repair work.

## **1.7 MEASUREMENT FOR PAYMENT**

- .1 Payment shall be based on a lineal measurement of cracks injected. Crack injection shall be measured by the Contract Administrators in the presence of the Contractor to the nearest 0.1 metre. The Contractor shall not exceed beyond the limits of the repair areas which have been agreed upon without prior authorization by the Contract Administrator.
- .2 The unit prices for crack injection shall be full compensation for the, surface preparation, port installation, port removal, removal and reinstatement of piping, ducting, conduit, light fixtures and any other items required to accommodate the work and for the supply and installation of the crack injection material of the type as specified.

## **1.8 WARRANTY**

- .1 The Contractor shall provide a written warranty for a period of 3 years from the date of final completion of the project as certified by the Contract Administrators. The Contractor shall warrant that the crack injection repairs will be free of defects related to workmanship or material deficiency. Any repair required under the warranty will be carried out in accordance with the recommendations of the Contract Administrator.

## **Part 2 Materials**

### **2.1 INJECTION**

- .1 Polyurethane Elastomer Grout (for leaking cracks) shall be:
  - .1 Polycast WTR as manufactured by MME Multiurethanes Ltd.
  - .2 Hydro Active Elastic as manufactured by De Neef.
  - .3 Approved Equivalent
- .2 Polyurethane Elastomer Grout (for dry cracks)
  - .1 Polycast Std. as manufactured by MME Multiurethanes Ltd.
  - .2 Hydro Active Flex as manufactured by De Neef.
  - .3 Approved Equivalent

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## **2.2 INJECTION PORTS**

- .1 The injection ports shall be approved plastic inserts. Surface mounted ports are not acceptable.

## **Part 3 Execution**

### **3.1 AREAS OF REPAIR**

- .1 The general areas requiring repair are identified on the drawings. Contractor to confirm with Contract Administrator the exact areas requiring repair prior to commencing work.
- .2 Contractor will delineate and mark areas with approval of Contract Administrator.

### **3.2 SURFACE PREPARATION**

- .1 Grind surface of all cracks to remove all paint, dirt and debris.
- .2 Place a layer of quick setting cement, epoxy or polyester gel along the length of the crack to contain injection resin. Containment material must be of sufficient strength and thickness in order to withstand the forces incurred during the grouting process.
- .3 Mark out the location of all injection ports, agree on spacing with Contract Administrator.

### **3.3 POLYURETHANE ELASTOMER GROUT**

- .1 Drill inclined holes at 45° through concrete in order that the holes penetrate the crack at roughly mid depth of the wall/roof. Spacing of the holes shall not exceed 300mm along the crack. Holes should be of sufficient diameter to correspond to the size requirements of the injection ports.
- .2 Epoxy the plastic injection ports in place and seal between the cracks using containment epoxy. Do not carry out water testing until the epoxy has completely cured.
- .3 Carry out injection of all cracks using water to flush out all debris to ensure free flow of injection material.
- .4 Commence injection (using a hand gun, pressure pot or injection machine, the pressure shall not exceed 0.2 MPa) at the lowest port on a vertical face. Continue injection until pure uncontaminated material flows from the adjacent port. The volume of polyurethane material to be used per injection shall equal 1/3 of the volume of the crack to be filled over a 300mm interval.
- .5 Where there is insufficient moisture present in the crack to facilitate the proper reaction with the polyurethane resin, inject a suitable amount of water into the each hole to ensure adequate reaction prior to injection of the resin material.
- .6 Pump grout into injection port until grout starts to come out of the adjacent port.

- .7 Close the adjacent injection port.
- .8 Repeat steps 6 and 7 for all remaining ports.

### **3.4 FINAL CLEANUP**

- .1 Upon completion remove all debris and excess material from the site.
- .2 Wash with water all surfaces, including concrete slab, wall, signage, doors, etc., to remove dust. Use high pressure washing except at areas adjacent to exposed lights or sprinkler head, etc., which may be damaged. Low pressure cleansing and brushing as necessary will be required in these areas.
- .3 Prior to leaving the site accompany the Contract Administrator in a final inspection of all work areas.

**END OF SECTION 03 64 23**

**Part 1            General**

**1.1                CERTIFICATES**

- .1        Provide certification that plant, equipment and materials to be used in concrete comply with requirements of CAN 3-A23.1.

**1.2                SUBMITTALS**

- .1        Submittals in accordance with Section 01 33 00 - Submittals.
- .2        The Contractor shall submit three copies of the mix designs for concrete a minimum of 15 working days prior to placement of concrete.
- .3        Submit testing results and reports for review to the Contract Administrator and do not proceed without written approval when deviations from mix design or parameters are found.
- .4        Concrete pours: submit accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.
- .5        Concrete hauling time: submit for review to the Contract Administrator deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

**1.3                REFERENCES**

- .1        Except where modified by this section or the Contract Drawings, the specifications (latest edition) listed below shall govern:
  - .1        CAN3-A23.1 Concrete Materials and Methods of Construction
  - .2        CAN/CSA S413 Parking Structures
  - .3        CAN3-A266.4 Guidelines for Use of Admixtures in Concrete
  - .4        CAN/CSA-A23.5 Supplementary Cementing Materials

**1.4                CONDUIT**

- .1        Hidden conduit damaged during the execution of the work shall be repaired at the City's expense on a time and materials basis provided reasonable care is taken to avoid such damage. As part of avoiding any overt conduit damage, the affected areas of repair should be scanned in an efforts to locate hidden conduit.
- .2        Where damage occurs to hidden conduit as a result of the Contractor or his subcontractors failing to take reasonable care, the Contractor shall be responsible for the cost of repair.

- .3 Hidden conduit exposed during repairs which is severely corroded shall, when approved by the Contract Administrator, be replaced with surface mounted electrical conduit, made fully operational, at the City's expense, on a time and materials basis.
- .4 Exposed electrical conduits damaged during the execution of the work shall be replaced with surface mounted electrical conduit, and made fully operational without charge to the City. Surface mounted conduit shall be mechanically unfastened from the concrete surface to facilitate repairs. Conduit shall be fully protected during work and reinstated on completion.

## **1.5 MEASUREMENT FOR PAYMENT**

- .1 The repair areas shall be the projected surface area in square metres. The surface area dimensions shall be measured to the nearest 0.1 metre. Measurements shall be carried out by the Contract Administrator in the presence of the Contractor. Final measurements for payment of all concrete repairs to be carried out shall be measured and agreed upon by the Contract Administrator and the Contractors prior to removal.

## **1.6 SURFACE COATINGS**

- .1 After completion of concrete repairs, paint coatings on columns and walls shall be reinstated. New surface coatings shall be of colour and texture to blend into the existing building surface to highest degree possible.
- .2 Contractor to include cost of surface coating reinstatement in unit prices for concrete repair work.

## **Part 2 Materials**

### **2.1 CONCRETE**

- .1 Top surface repair concrete:
  - .1 Concrete to conform to CAN3-A23.1, exposure Class: C-1, unless modified herein. Use type 10 cement to give minimum compressive strength of 35 MPa in 28 days with 10mm nominal aggregate size, slump at point of discharge 80mm maximum, 7.5%  $\pm$ 1.5% entrained air.
  - .2 Corrosion inhibitor shall be Catexol 1000 CI as manufactured by Axim Italcementi Group or approved equivalent in accordance with Section B6. The minimum dosage shall be 15 L/m<sup>3</sup> in accordance the manufactures instructions and recommendation of appendix C corrosion inhibitors–CAN/CSA S413.
- .2 Through Slab Repair Concrete
  - .1 Concrete to conform to CAN3-A23.1, exposure Class: C-1, unless modified herein. Use type 10 cement to give minimum compressive strength of 35 MPa in 28 days with 20mm nominal aggregate size, slump at point of discharge 80mm maximum, 6.5%  $\pm$ 1.5% entrained air.

- .2 Corrosion inhibitor shall be Catexol 1000 CI as manufactured by Axim Italcementi Group or approved equivalent in accordance with Section B6. The minimum dosage shall be 15 L/m<sup>3</sup> in accordance the manufactures instructions and recommendation of appendix C corrosion inhibitors–CAN/CSA S413.

## **2.2 ADMIXTURES**

- .1 Concrete admixtures shall be compatible with one another, and used in accordance with manufacturer's instructions, and CAN3-A266.4, "Guidelines for Use of Admixtures in Concrete".

## **2.3 BONDING AGENTS**

- .1 Cement bonding slurry be made of a 1:1 ratio of Portland cement to fine aggregate by weight with sufficient water to form a cream like consistency.
- .2 Non shrink grout bonding agent shall be Sika Top-Armatec 110 as manufactured by Sika Canada Inc. or approved equivalent in accordance with Section B6.

## **2.4 NON SHRINK-GROUT**

- .1 Sika 212 as manufactured by Sika Canada Inc.
- .2 Approved equivalent in accordance with Section B6.

## **2.5 REINFORCING STEEL**

- .1 Refer to section 03 20 00.

## **Part 3 Execution**

### **3.1 AREAS OF REPAIR**

- .1 Contractor will delineate and mark delaminated areas on the concrete surface using hammer sounding techniques and/or by chain dragging. Obtain Contract Administrator's approval before commencing concrete removal.
- .2 As concrete removal progresses, extensions to the above marked areas may be necessary. Obtain Contract Administrator's approval of these additional areas before removal begins.
- .3 Soffit delamination repairs will be broken through from above except where directed by Contract Administrator.

### **3.2 SHORING**

- .1 Design the shoring to safely support the loads it will be subjected to during construction. The shoring shall be designed by a professional engineer registered in the

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Province of Manitoba and experienced in shoring design. Shoring installation shall be reviewed by the Contract Administrators prior to commencement of any concrete removal.

- .2 Shoring shall be installed in accordance with the reviewed shop drawings. Ensure that all installed shores are vertically plumb and snug at all times.

### **3.3 FORMWORK**

- .1 The Contractor shall construct all formwork including shoring and bracing to resist loads due to the weight of wet concrete, self-weight of forms and fluid pressure of concrete and to the requirements of CAN3-A23.1.
- .2 Formwork shall be constructed with joints sufficiently tight to prevent leakage of grout or concrete. The edges of all plywood sheets shall be backed or supported to prevent separation or opening.
- .3 Formwork shall be constructed with joints sufficiently tight to prevent leakage of grout or concrete.
- .4 The edges of all plywood sheets shall be backed or supported to prevent separation or opening.
- .5 Ensure that all steel reinforcement is tied and/or secured properly so that sufficient cover to the forms is provided. Use plastic or prefabricated chairs.
- .6 Formwork shall remain in place until concrete has reached 75 percent of its 28 day compressive strength or 4 days minimum or as directed by Consultant.

### **3.4 DELAMINATED CONCRETE REMOVAL**

- .1 No larger than 14kg class chipping hammers shall be used for removal of concrete cover to reinforcing steel. No larger than 7kg class chipping hammers shall be used for removal of concrete around and behind reinforcing steel.
- .2 The concrete in the repair area shall be removed until sound concrete is reached or to a minimum depth of 25mm below the reinforcing steel. Concrete shall not be removed beyond this limit except where authorized by the Contract Administrators.
- .3 Chipping shall extend along all reinforcing bars to the point where the exposed bars are free of heavy rust.
- .4 Upon completion of initial chipping, the concrete surface immediately surrounding the repair area should be sounded for local delaminations. Chip additional delaminated areas as required.
- .5 The perimeter of the patches shall be saw cut to a minimum of 13mm (1/2") deep to provide a vertical surface.

### **3.5 ABRASIVE BLAST CLEANING**

- .1 The reinforcement shall be sandblasted to SSPC-SP10 (near-white blast cleaning). The Contractor must ensure that adequate precautions are undertaken to protect the surrounding environment from damage resulting from blast cleaning operations.

### **3.6 CONCRETE PREPARATION**

- .1 The prepared concrete surface shall be thoroughly wetted down with potable water.
- .2 The approved bonding agent shall be applied to the concrete surface prior to the placement of the repair mortar. The bonding agent shall be scrubbed into the surface, fully filling all voids and irregularities.
- .3 Apply concrete mix when bonding agent is still wet. If bonding agent is allowed to dry, then an additional coat of bonding agent will be required. Pencil vibrators shall be used for consolidation.

### **3.7 PRESSURE GROUTING**

- .1 Apply grout in accordance with the manufacturers recommended.
- .2 Mix and place bonding agent accordance with the manufacturers recommended.
- .3 The non-shrink grout shall be mixed and placed in accordance with the manufacturer's recommendations.

### **3.8 FINISHING AND CURING**

- .1 Finish and cure concrete in accordance with CAN/CSA-A23.1. Repair surfaces shall be finished to the same level as the surrounding surfaces unless instructed otherwise.

### **3.9 FIELD QUALITY CONTROL**

- .1 Inspection and testing of the concrete and concrete material will be carried out by a designated testing laboratory and in accordance with CAN/CSA A23.1 and as directed by the Contract Administrator.
- .2 Number and frequency of cylinder tests taken shall be as follows: two 28-day and one 7-day test specimen taken for each 50 cubic metres of concrete, or fraction thereof, for each class of concrete cast. Frequency of slump and air content tests shall be determined by the Contract Administrator.
- .3 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Contract Administrator for review in accordance with CSA-A23.1/A23.2. Ensure testing laboratory is certified in accordance with CSA A283.
- .4 Ensure test results are distributed for discussion at pre-pouring concrete meeting between Contract Administrator.

- .5 Contractor will pay for costs of tests as specified in Section 01 29 83 - Payment Procedures for Testing Laboratory Services.
- .6 Non-Destructive Methods for Testing Concrete: in accordance with CSA-A23.1/A23.2.
- .7 Inspection or testing by Contract Administrator will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

**END OF SECTION 03 70 00**

**Part 1 General**

**1.1 REFERENCE STANDARDS**

- .1 ASTM International
  - .1 ASTM A53/A53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 CSA International
  - .1 CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CAN/CSA G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .3 CSA S16-09, Design of Steel Structures.
  - .4 CAN/CSA-S136, North American Specifications for the Design of Cold Formed Steel Structural Members.
  - .5 CSA W47.1, Certification of Companies for Fusion Welding of Steel.
  - .6 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
  - .7 CSA W59, Welded Steel Construction (Metal Arc Welding).
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittals.
- .2 Product Data:
  - .1 Submit applicable manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit copies of WHMIS MSDS in accordance with Section 01 35 30 - Safety Requirements.
    - .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.
- .3 Shop Drawings:
  - .1 Submit drawings stamped, dated and signed by professional engineer licensed in the Province of Manitoba, Canada.
  - .2 Indicate dimensions, materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

### **1.3 QUALITY ASSURANCE**

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

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

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address, where applicable.
- .3 Storage and Handling Requirements:
  - .1 Store materials in accordance with manufacturer's recommendations: clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Steel plates and rod: to CSA G40.20/G40.21, Grade 300W.
- .2 Steel pipe: to ASTM A53/A53M standard weight, schedule 40.
- .3 Steel tubing: to CSA G40.20/G40.21, Grade 350W Class C.
- .4 Welding materials: to CSA W59.
- .5 Welding electrodes: to CSA W48 Series.
- .6 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164.

### **2.2 FABRICATION**

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Where possible, fit and shop assemble work, ready for erection.
- .3 Ensure exposed welds are continuous for length of each joint, unless noted otherwise on drawings. Grind or file unusually uneven/unsightly welds and sharp corners of steel sections smooth.

### **2.3 FINISHES**

- .1 Galvanizing: hot dipped galvanizing with zinc coating to CAN/CSA-G164.

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**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
  - .1 Inform Consultant of unacceptable conditions immediately upon discovery.
  - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

**3.2 ERECTION**

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage as indicated on drawings.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Supply components for work by other trades in accordance with shop drawings and schedule.
- .6 Make field connections with welds and anchors as indicated on drawings.
- .7 Where required, deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.
- .8 Touch-up damaged or scratched surfaces with zinc rich primer.
- .9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

**3.3 CLEANING**

- .1 Cleaning: clean in accordance with Section 01 74 12 – Cleaning, Protection, Demolition.
  - .1 Leave Work area clean at end of each day.
  - .2 Final Cleaning: remove surplus materials, rubbish, tools and equipment.
- .2 Waste Management: separate applicable waste materials for recycling or reuse in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
  - .1 Remove any recycling containers and bins from site and dispose of materials at appropriate facility.

**3.4 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by metal fabrications installation.

**END OF SECTION 05 50 00**

**Part 1 General**

**1.1 SCOPE OF WORK**

- .1 This section shall be responsible for all materials, labour, plant tools, and equipment necessary for the installation of a rubberized asphaltic membrane as specified and as shown on the drawings.

**1.2 SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittals.
  - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittals. Indicate VOC's.
  - .3 Two copies of manufacturer's specifications for all products incorporated into the membrane system.
  - .4 A written acceptance from the membrane manufacturer stating that all the concrete and other surfaces with which the waterproofing membrane will come into contact with are fully adequate for the installation of the waterproofing system, prior to installing the primer.
  - .5 A set of written instructions for maintenance requirements.
- .2 Design Requirements
  - .1 The membrane system both listed and those submitted for consideration as alternatives must have the capability of accommodating structural movements and deflection and cracks up to 1.5mm in width.

**1.3 MATERIAL AND INSTALLATION REQUIREMENTS**

- .1 Adhesion of the waterproofing materials to the concrete substrate must be a minimum of 0.7 MPa.
- .2 The concrete surface temperature and the ambient temperature shall be maintained at a minimum of 5°C 24 hours unless specifically permitted within manufacturer's recommended prior to placement and during placement.
- .3 The moisture content of the concrete substrate shall be maintained within the waterproofing manufacturer's limits during the application of the waterproofing membrane.
- .4 Installation procedures and details shall be completed in full accordance with manufacturer's instructions.
- .5 Where details shown on the drawings or in the specification are not in accordance with manufacturers requirements, notify Contract Administrator.

#### **1.4 QUALIFICATIONS**

- .1 The Contractor performing the work under this section shall:
  - .1 Have a minimum of five (5) years proven satisfactory experience in the application of hot rubberized membrane systems.
  - .2 Have adequate equipment and skilled personnel to expediently complete this work.
  - .3 Approved systems must be capable of adequately performing on all the specified surfaces and shall be applied in strict accordance with the instructions provided by the manufacturer.

#### **1.5 STANDARD SPECIFICATIONS**

- .1 Except where modified by this section or the contract drawings, the specifications listed below shall govern.
  - .1 CAN/CGSB 37-GP-9M Primer, Asphalt, Unfilled, for Asphalt Roofing, Damproofing and Waterproofing
  - .2 CAN/CGSB 37.50M Hot Applied, Rubberized Asphalt for Roofing and Waterproofing
  - .3 CAN/CGSB 37.51M Application for Hot Applied Rubberized Asphalt, for Roofing and Waterproofing

#### **1.6 STORAGE**

- .1 Material shall be delivered and stored on site in their original containers or packages and clearly labelled as to manufacturer's name and quantity.
- .2 Materials shall be kept dry and protected from damage, weather and deterioration at all times. Store materials in warm and dry areas.

#### **1.7 WARRANTY**

- .1 The waterproofing system shall be guaranteed with a written warranty to be free of defects in workmanship and materials for a period of five (5) years from the date of completion of this contract as certified by the Contract Administrators.
- .2 Any repair required under the warranty will be carried out in accordance with the recommendations of the Contract Administrators.

#### **1.8 INSPECTION**

- .1 Installation of the hot rubberized membrane system will be inspected on behalf of the City by Concentric.
- .2 Thickness of the membrane will be checked at random locations by a penetrating depth gauge or by cut tests. The bond between the membrane and the concrete substrate will be evaluated at random location.

- .3 Any work not accepted by the Contract Administrators shall be immediately corrected by the Contractor.
- .4 Costs associated with the re-inspection of deficient work will be paid by the Contractor.

## **1.9 MEASUREMENT FOR PAYMENT**

- .1 The contract is a stipulated sum for the installation of hot rubberized membrane and shall be full compensation for the work and materials supplied in this section, which includes preparation of base surfaces, treatment of cracks and surface voids, supply and installation of protection boards and for the supply and installation of the membrane system.
- .2 Measurement of the membrane thickness to be measured to the nearest 1 millimeter.

## **Part 2 Materials**

### **2.1 WATERPROOFING MEMBRANE**

- .1 The following have been approved for use on this project
  - .1 Hydrotech 6125 as manufactured by Hydrotech Membrane Corporation.
  - .2 790-11 as manufactured by Bakor.
  - .3 Equivalent approved by Contract Administrator.

### **2.2 SURFACE CONDITIONER**

- .1 Surface conditioner shall be 56170, as supplied by Hydrotech Membrane Corporation or approved equal in accordance with Section B6 to CGSB 37-GP-9M.

### **2.3 MEMBRANE FABRIC REINFORCEMENT**

- .1 Membrane fabric reinforcement shall be polyester spunbonded fabric, supplied by Hydrotech Membrane Corporation or approved equal.

### **2.4 STANDARD REINFORCING SHEET**

- .1 Membrane reinforcement shall be an elastosheet 300mm in width, Hydrotech 6147 elastosheet or approved equal in accordance with CGSB SP-64M.

### **2.5 HEAVY DUTY REINFORCING SHEET**

- .1 Membrane reinforcement shall be an elastosheet 300mm in width, Hydrotech 6146 elastosheet or approved equal in accordance with CGSB SP-64M.

### **2.6 CRACK SEALANT**

- .1 The crack sealant shall be Hi Spec 590-13 as manufactured by Bakor or approved equal.

### **2.7 JOINT SEALANT**

- .1 Joint sealer shall be Hydrotech Sealz 6165 or approved equal.

## **2.8 SECUREMENT BAR**

- .1 Continuous 3mm x 25mm x 3000mm aluminum, stainless or galvanized bar, pre-drilled for screws.

## **2.9 PROTECTION BOARD**

- .1 Tremco® 2178 protection course as manufactured by Tremco.
- .2 Approved equivalent.

## **Part 3 Execution**

### **3.1 SURFACE AND ENVIRONMENTAL CONDITIONS**

- .1 Concrete surfaces shall be clean and dry with a minimum wood float finish and uniform surface.
- .2 Deteriorated, delaminated and scaled concrete must be repaired prior to membrane installation.
- .3 Installation of the membrane shall not be undertaken during inclement weather or on frost or wet covered surfaces.
- .4 The waterproofing Contractor will be responsible for maintaining the level of cleanliness achieved during the interval between acceptance of the work and the actual application of the membrane.

### **3.2 NEW CONCRETE AREAS**

- .1 Installation of the waterproofing membrane on newly repaired concrete surfaces shall not be undertaken until a minimum cure time of 14 days is achieved or until the desired moisture content of the concrete or repair mortar, as recommended by the manufacturer, has been achieved and verified by testing.

### **3.3 PREPARATION OF SURFACES TO RECEIVE WATERPROOFING MEMBRANE**

- .1 Surfaces shall be clean and dry, free from surface water, ice, snow or frost, dust, dirt, grease, oil, soap, wax, paint, curing compound, laitance, and any other foreign materials before waterproofing operations commence.
- .2 Areas where the surface is rough or where ridges exist must be prepared to provide the best possible surface for the waterproofing. All depressions and large voids in the concrete must be filled with an approved concrete mix on a fully prepared surface.

- .3 Concrete surfaces to receive waterproofing shall be prepared by shotblasting in order to yield the best possible surface and in full accordance with manufacturer's instructions. Sandblasting and acid etching are not acceptable surface preparation methods. Areas not accessible to the shotblasting machine such as near column bases and vertical faces shall be sandblasted to remove loose bond inhibiting materials.
- .4 Cracks and depressions shall be air blasted cleaned.

### **3.4 SURFACE CONDITIONER**

- .1 Apply surface conditioner uniformly over the entire area to receive waterproofing membrane within the time limit as specified by the manufacturer at rate of application and under conditions stated in manufacturer's recommendations.
- .2 Allow ponding to dry before membrane application.

### **3.5 CRACKS AND CONSTRUCTION JOINTS**

- .1 Cracks, construction joints and perimeters of through slab repairs less than 1.5mm wide shall receive a double application of the membrane reinforced with a fully embedded mat of fabric reinforcement, 300mm wide and centered on the crack or joint. The second application must overlap the first by 75mm. This work shall be performed prior to application of membrane layers over full area.
- .2 Construction joints, cracks and perimeters of through slab repairs greater than 1.5mm wide shall be routed to form a 10mm by 10mm joint. A bond breaker and joint sealer shall be installed as recommended by the manufacturer.

### **3.6 DECK TO VERTICAL JUNCTURES**

- .1 Vertical junctures to the deck shall receive a double application of the membrane reinforced with a fully embedded mat of standard reinforcing sheet. The reinforcing sheet shall extend 150mm on the horizontal surface and 150mm up the vertical surface. The second application must overlap the first by 75mm. Install continuous securement bars and fasten at 150mm o/c over second layer of membrane. This work shall be performed prior to application of membrane layers over full area.
- .2 Lap height shall be uniform not ragged in appearance.
- .3 Where indicated on drawings install metal flashing sheet fully embedded in the membrane. Mechanically attach the metal flashing using continuous fastening bars where vertical flashing height exceeds 300mm.

### **3.7 SURFACE CONDITIONER APPLICATION**

- .1 When surface conditioner is fully dry, apply membrane in strict accordance with manufacturer's recommendations with regard to rate of application, consistency, thickness, temperature, etc. Ensure full bond of membrane to substrate.

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**3.8 MEMBRANE APPLICATION**

- .1 Apply membrane smooth, free from air pockets, wrinkles, or tears and to manufacturer's Instructions. Ensure full bond of membrane to substrate.
- .2 Install two ply waterproofing membrane to achieve a continuous film a minimum thickness of 1.3 and a maximum of 2.0mm on the first ply and 1.3 and a maximum of 2.0mm on the second ply and as directed by the manufacturer.
- .3 Install a protection board while the membrane is still warm and tacky.
- .4 Membrane to be lapped up a minimum of 200mm at all vertical surfaces and as indicated on the drawings.
- .5 Lay out work to keep all vehicular and pedestrian traffic across the membrane to the absolute minimum.
- .6 Carefully mop membrane onto cleaned surfaces of floor drain seepage flanges. Do not block weep holes.
- .7 Install protection sheet with minimum 100mm overlap at joints.

**3.9 MEMBRANE WEAR COURSE**

- .1 Install membrane covering as detailed in as indicated on the drawings.

**3.10 SAFETY PRECAUTIONS**

- .1 Keep on hand, suitable safety equipment and first aid materials to provide against injury from the specific materials.
- .2 Assure that all workers using the materials understand the safety precautions to be taken and abide by them.

**3.11 CLEANING**

- .1 Employ manufacturer's recommended cleaning solvents to remove sealer inadvertently applied to surfaces other than floor slabs and uniform laps at vertical surfaces.
- .2 Remove all unused materials and debris from the site on completion of the work.

**3.12 REPAIR OF DEFICIENCIES**

- .1 Any repair required under the warranty will be carried out in accordance with the recommendations of the Contract Administrators.

**End of Section 07 10 00**

**Part 1 General**

**1.1 SCOPE OF WORK**

- .1 This section shall be responsible for all materials, labour, plant tools, and equipment necessary for traffic topping work specified and shown on the Contract Drawings.

**1.2 SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittals.
  - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittals. Indicate VOC's.
  - .3 Two copies of manufacturer's specifications for all products incorporated into the membrane system.
  - .4 Written acceptance from the traffic topping manufacturer stating that all the concrete and other surfaces with which the traffic topping will come into contact with are fully adequate for the installation, prior to installing the primer and/or membrane.
  - .5 A set of written instructions for maintenance requirements.

**1.3 MATERIAL AND INSTALLATION REQUIREMENTS**

- .1 Adhesion of the waterproofing materials to the concrete substrate must be a minimum of 0.7 MPa.
- .2 The concrete surface temperature and the ambient temperature shall be maintained within manufacturer's recommendations prior to placement, during placement and after placement.
- .3 The moisture content of the concrete substrate shall be maintained within the traffic topping manufacturer's limits during the application of the traffic topping.
- .4 Thickness of the membrane will be checked at random locations by a wet film thickness gauge and/or by cut tests.

**1.4 QUALIFICATIONS**

- .1 The Contractor shall have a minimum of five (5) years proven satisfactory experience in the application of traffic topping system and have adequate equipment to expediently complete this work.

**1.5 REFERENCES**

- .1 Except where modified by this section or the Contract Drawings, the specifications (latest edition) listed below shall govern:

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- .1 CAN/CGSB-37.58 Membranes, Elastomeric.
- .2 ASTM C957 Standard Specification for High Solids Contents, Cold Liquid-Applied Elastomeric Waterproofing Membrane with Integral Wearing Surface
- .3 CAN/CSA S413 Parking Structures

## **1.6 WARRANTY**

- .1 The traffic topping system shall be guaranteed with a written warranty to be free of defects in workmanship and materials for a period of three (3) years from the date of completion of this contract as certified by the Contract Administrator. Any repair required under the warranty will be carried out in accordance with the recommendations of the Contract Administrator.

## **1.7 MEASUREMENT FOR PAYMENT**

- .1 The traffic topping will not be measured but will be paid for as a fixed price item.
- .2 The fixed price shall be full compensation for the removal of the existing drive aisle traffic topping, the preparation of base surfaces, treatment of cracks and surface voids and the supply and installation of the traffic topping system specified in clause 2.1.

## **1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

## **Part 2 Materials**

### **2.1 TRAFFIC TOPPING SYSTEMS**

- .1 Auto-Gard E- Heavy Duty System as manufactured by Neogard.
  - .1 In accordance with manufacturers recommended thickness.
- .2 MasterSeal 350 Parking Deck System as manufactured by BASF.
  - .1 In accordance with manufacturers recommended thickness.
- .3 Sikalastic-220 FS as manufactured by Sika Canada.
  - .1 In accordance with manufacturers recommended thickness.
- .4 Approved equal.

### **2.2 COLOUR**

- .1 Colour: approved by the City from manufacturers standard colour range.

### **2.3 SEALANT**

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- .1 Shall be compatible with the waterproofing system specified and approved for use by the Contract Administrator.

## **2.4 PAINT PAVEMENT MARKINGS**

- .1 To MPI -EXT 2.1B, Alkyd zone/traffic marking.
- .2 Paints: in accordance with MPI recommendation for surface conditions.
- .3 Paints: maximum VOC limit 100 g/L to SCAQMD Rule 1113.
- .4 Colour: to MPI listed, yellow.
- .5 Thinner: to MPI listed manufacturer.

## **Part 3 Execution**

### **3.1 REMOVAL OF EXISTING TRAFFIC TOPPING**

- .1 Remove existing traffic topping to the extent indicated on the drawings.
- .2 Remove in a manner so as not to damage the concrete surface below. Removal is to be performed until sound, bonded membrane is encountered. Prepare edges of existing traffic topping yield clean edge free from any debonded sections.

### **3.2 SURFACE CONDITIONS**

- .1 Concrete surfaces shall be clean and dry with a minimum wood float finish and uniform surface. Repair deteriorated, delaminated and scaled concrete prior to membrane installation.
- .2 The waterproofing Contractor will be responsible for maintaining the level of cleanliness achieved during the interval between acceptance of the work and the actual application of the traffic topping system.

### **3.3 SURFACE PREPARATION**

- .1 Surfaces shall be clean and dry, free from surface water, ice, snow or frost, dust, dirt, grease, oil, soap, wax, paint, curing compound, laitance, and any other foreign materials before waterproofing operations commence.
- .2 Areas where the surface is rough or where ridges exist must be prepared to provide the best possible surface for the traffic topping. Depressions and large voids in the concrete must be filled with an approved concrete mix on a fully prepared surface.
- .3 Concrete surfaces to receive waterproofing shall be prepared by shotblasting to yield the best possible surface and in full accordance with manufacturer's instructions. Sandblasting and acid etching are not acceptable surface preparation methods. Areas not

accessible to the shotblasting machine such as near column bases, and vertical faces shall be sandblasted to remove loose bond inhibiting materials.

### **3.4 SURFACE CONDITIONER**

- .1 Apply primer uniformly over the entire area to receive waterproofing membrane within the time limit as specified by the manufacturer at rate of application and under conditions stated in manufacturer's recommendations.

### **3.5 TREATMENT OF CRACKS**

- .1 Cracks, construction joints and perimeters of through slab patches less than 1.5mm shall receive an application of membrane 300mm wide over the centre of the crack.
- .2 Cracks, construction joints and perimeters of through slab patches greater than 1.5mm shall be ground out to a minimum of 6mm wide by 13mm deep. Prime routed crack as required by manufacturer of sealant and install an approved bond breaker. Apply membrane as indicated 3.6.1.

### **3.6 APPLICATION**

- .1 Mix materials in full accordance with manufacturer's instructions.
- .2 Apply base coat and wear course in accordance with manufacturer's written instructions. Pay particular attention to rate of application and thickness.
- .3 Install epoxy wear course to thickness recommended by manufacturer.
- .4 If the thickness of the material is determined to be less than that specified, additional material shall be placed after the specified curing time has elapsed on the last application.
- .5 Broadcast the aggregate to obtain the required slip resistant surface and in accordance with manufacturer's recommendations.

### **3.7 PAINTED PAVEMENT MARKINGS**

- .1 Reinstate painted pavement markings to match original.
- .2 Paint applicator: approved pressure with positive shut-off distributor capable of applying paint in single, double and dashed lines and capable of applying marking components uniformly, at rates specified, and to dimensions as indicated.
- .3 Pavement markings: Lay out pavement markings.
- .4 Apply paint only when air temperature is above 10 degrees C
- .5 Apply traffic paint evenly at rate of 3 m<sup>2</sup>/L.
- .6 Do not thin paint unless approved by the Contract Administrator.

- .7 Symbols and letters to dimensions indicated.
- .8 Paint lines: of uniform colour and density with sharp edges.
- .9 Thoroughly clean distributor tank before refilling with paint of different colour.
- .10 Paint markings: within plus or minus 12 mm of dimensions indicated.

### **3.8 SAFETY PRECAUTIONS**

- .1 Keep on hand, suitable safety equipment and first aid materials to provide against injury from the specific materials. Assure that all workers using the materials understand the safety precautions to be taken and abide by them.
- .2 Provide adequate measures including venting and plastic enclosures to ensure that no fumes enter the building.

### **3.9 CLEANING**

- .1 Employ manufacturer's recommended cleaning solvents to remove sealer inadvertently applied to surfaces other than floor slabs and uniform laps at vertical surfaces.
- .2 Remove all unused materials and debris from the site on completion of the work.

### **3.10 REPAIR OF DEFICIENCIES**

- .1 Any repair required under the warranty will be carried out in accordance with the recommendations of the Contract Administrator.

**END OF SECTION 07 10 70**

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**Part 1            General**

**1.1                SCOPE OF WORK**

- .1            This section shall be responsible for all materials, labour, plant tools, and equipment necessary for the installation of joint sealant as specified and shown on the Contract Drawings.

**1.2                REFERENCES**

- .1            Except where modified by this section or the Contract Drawings, the specifications (latest edition) listed below shall govern:
  - .1            CAN/CGSB-19.24 Multi-component, Chemical Curing Sealing Compound.

**1.3                QUALIFICATIONS**

- .1            The Contractor performing the work under this section shall:
  - .1            Have adequate equipment and skilled personnel to expediently complete this work.
  - .2            Approved systems must be capable of adequately performing on all the specified surfaces and shall be applied in strict accordance with the instructions provided by the manufacturer.

**1.4                DELIVERY, STORAGE, AND HANDLING**

- .1            Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.
- .2            Materials shall be kept dry and protected from damage, weather and deterioration at all times. Store materials in warm and dry areas.

**1.5                WARRANTY**

- .1            The sealant shall be guaranteed with a written warranty to be free of defects in workmanship and materials for a period of two (2) years from the date of completion of this contract as certified by the Contract Administrators.
- .2            Any repair required under the warranty will be carried out in accordance with the recommendations of the Contract Administrators.

**Part 2            Materials**

**2.1                SEALANT**

- .1            Sealant shall be Dymeric 240 as manufactured by Tremco, or approved equal.

- .1 Colour to match existing.

## **2.2 BACK-UP MATERIALS**

- .1 Back-up materials shall be an extruded closed cell foam backer rod. Size shall be oversized by 30% to 50%.

## **2.3 PRIMER**

- .1 Primer shall be as recommended by manufacturer.
- .2 Joint cleaner shall be non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

## **Part 3 Execution**

### **3.1 PREPARATION OF SURFACES**

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair work.
- .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
- .4 Ensure joint surfaces are dry and frost free.
- .5 Prepare surfaces in accordance with manufacturer's directions.

### **3.2 PRIMING**

- .1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
- .2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

### **3.3 BACKUP MATERIAL**

- .1 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

### **3.4 APPLICATION**

- .1 Mix materials in strict accordance with sealant manufacturer's instructions.
- .2 Apply sealant in accordance with manufacturer's written instructions.

- .3 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
- .4 Apply sealant in continuous beads.
- .5 Apply sealant using gun with proper size nozzle.
- .6 Use sufficient pressure to fill voids and joints solid.
- .7 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .8 Tool exposed surfaces before skinning begins to give slightly concave shape.
- .9 Remove excess compound promptly as work progresses and upon completion.
- .10 Cure sealants in accordance with sealant manufacturer's instructions.

### **3.5 CLEANUP**

- .1 Clean adjacent surfaces immediately and leave work neat and clean.
- .2 Remove excess and droppings, using recommended cleaners as work progresses.
- .3 Remove masking tape after initial set of sealant.

**END OF SECTION 07 90 00**

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**Part 1            General**

**1.1                REFERENCES**

- .1     ASTM D412- latest edition, Test Method for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
- .2     ASTM D1044- latest edition, Test Method for Resistance of Transparent Plastics to Surface Abrasion.
- .3     ASTM D2369- latest edition, Test Method for Volatile Content of Coatings.
- .4     ASTM D2832- latest edition, Standard Guide for Determining Volatile and Non-volatile Content of Paint and Related Coatings.
- .5     ASTM E84- latest edition, Test Method for Surface Burning Characteristics of Building Materials.
- .6     ASTM E96- latest edition, Test Methods for Water Vapor Transmission of Materials.
- .7     CAN/CGSB-1.188- latest edition, Emulsion Filler for Masonry Block.
- .8     Underwriters' Laboratories of Canada (ULC).

**1.2                SUBMITTALS**

- .1     The Contractor shall submit the following in writing:
  - .1     Two copies of manufacturer's specifications for all products incorporated into the architectural coating system.
  - .2     Provide the Contract Administrator with a written acceptance from the coating manufacturer stating that all the concrete and other surfaces with which the coating will come into contact with are fully adequate for the installation, prior to installing the primer and/or membrane.
  - .3     A set of written instructions for maintenance requirements.

**1.3                QUALITY ASSURANCE**

- .1     Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
  - .1     Apply coating of each finish and decorative effect 10m<sup>2</sup> area of surface to be treated.
  - .2     Allow 48 hours for inspection of mock-up by Contract Administrator before proceeding with work.
  - .3     When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may not remain as part of finished work.
- .2     Health and Safety:

- .1 Do construction occupational health and safety in accordance with Section 01 35 30 Requirements.
- .2 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Canada Labour Code.

#### **1.4 MEASUREMENT PROCEDURE**

- .1 Coating is measured as a lump sum item.

#### **1.5 DELIVERY, STORAGE AND DISPOSAL**

- .1 Waste Management and Disposal:
  - .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal and with Waste Reduction Work plan.
  - .2 Remove from site and dispose of packaging materials and emptied containers at appropriate recycling facilities.
  - .3 Divert unused coating materials from landfill through disposal at a special wastes depot.

#### **1.6 PROJECT/SITE CONDITIONS**

- .1 Environmental Requirements:
  - .1 Temperature: minimum temperature of substrate 10 degrees C. Minimum temperature of air during and for 48 hours before and after coating is applied 15 degrees C.
- .2 Ventilation:
  - .1 Provide continuous ventilation during and after coating application.

#### **1.7 PRODUCT DATA**

- .1 Submit product data if requested.
- .2 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation.

### **Part 2 Products**

#### **2.1 COATING**

- .1 Thorolastic as manufactured by BASF Chemical Company.
- .2 Approved Equivalent.
- .3 Primer as recommended by coating manufacturer.

- .4 Colour by the City of Winnipeg from standard colour ranges.

### **Part 3 Execution**

#### **3.1 CRACK REPAIR**

- .1 Patch cracks and surface defects as directed by coating manufacturer.

#### **3.2 EXAMINATION**

- .1 Ensure that items penetrating coating are placed before application of coating.
- .2 Ensure maximum moisture content of substrate does not exceed manufacturer's specifications.
- .3 Ensure negative alkalinity of substrate before application of coating.

#### **3.3 PREPARATION**

- .1 Protect adjacent surfaces and equipment from damage by over spray, fall-out and dusting.
- .2 Clean substrate of matter which would affect bond of applied coating.

#### **3.4 APPLICATION**

- .1 Apply substrate filler coat 0.75 mm minimum thickness over completely dry concrete, concrete masonry, and other coarse surfaces as required to achieve a 100% filled, smooth surface with no pin holes and voids.
- .2 Prime surfaces according to manufacturer's directions. Allow to dry.
- .3 Apply coating employing trained applicators, using equipment specifically designed for this purpose and as directed by coating manufacturer.
- .4 Apply coating to a small test area and allow to set. Notify Contract Administrator to inspect mock-up.
- .5 Finished work: to match approved samples, be uniform in thickness, sheen, colour and texture and be free from marks, dirt particles, runs, crawls, drips, sags, brush marks, curling, holes, air pockets and other defects.
- .6 After final coat has cured 12 hours minimum, apply overglaze as directed by manufacturer.

#### **3.5 FIELD QUALITY CONTROL**

- .1 Inspection and testing of coating application will be carried out by coating manufacturer.

**3.6 FINAL CLEANUP**

- .1 Upon completion, remove all debris and excess material from the site.

**END OF SECTION 09 96 53**

**Part 1            General**

**1.1                SUBMITTALS**

- .1        Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittals.

**1.2                BYLAWS AND SPECIFICATIONS**

- .1        Bylaws shall conform to the requirements of the National Building Code (latest edition) and all amendments and all local Municipal and Provincial building by-laws, authorizations having jurisdiction and ordinances.
- .2        Standard specifications except where modified by this section or the contract drawings, the specifications (latest edition) listed below shall govern.
  - .1        National Building Code of Canada.
  - .2        National Research Canadian Plumbing Code.

**1.3                DELIVERY, STORAGE, AND HANDLING**

- .1        Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.
- .2        Materials shall be kept dry and protected from damage, weather and deterioration at all times. Store materials in warm and dry areas.

**Part 2            Products**

**2.1                MATERIALS**

- .1        Trench Drains shall be Z508 as manufactured by Zurn or approved equivalent.
- .2        Plumbing Fittings shall be cast iron that meets CAN3-B125-M85.
- .3        Drain pipe shall be cast iron pipe 100mm in diameter. Pipe shall have CSA mark of approval.
- .4        Pipe Hangers shall be Fabricate hangers and supports in accordance with ANSI B31.1 and MSS-SP58.
- .5        Anchors for cast-in-place concrete shall be galvanized steel wedge to MSS-SP58, Type 18. ULC listed for pipe NPS 3/4 through NPS 8.
- .6        Middle attachments shall be carbon steel threaded rod electro-galvanized for mechanical room finish.

- .7 Riser clamps shall be steel or cast iron pipe to MSS-SP58, Type 42. ULC listed.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Ensure condition of concrete surrounding the drains is sound prior to installing drains. Perform concrete repairs in accordance with Section 03 70 00 – Concrete Repairs as directed by the Contract Administrator.
- .2 The drain body must be installed such that the top flanges are flush with the top surface of the concrete deck.
- .3 Do not cut or damage any reinforcement to accommodate new drain installation unless authorized by the Contract Administrator.
- .4 Drain shall be connection to the existing drainage system in accordance with the latest edition of the local plumbing code.
- .5 Contractor to ensure that all debris is removed from the drains and that weep holes are clear.

**3.2 PIPE INSTALLATION**

- .1 Install straight parallel and close to walls and ceilings with uniform slope of 1:50. Use standard fittings for direction change.
- .2 Run pipes to closest drain riser.
- .3 Plug or cap pipe and fittings to keep debris out during construction.
- .4 Contractor to ensure that all debris is removed from the pipes.

**3.3 HANGER INSTALLATION**

- .1 Use approved pipe hangers and vertical clamps.
- .2 Offset hanger so that rod is vertical in operating position.
- .3 Adjust hangers to equalize load.

**END OF SECTION 22 42 01**

**Part 1 General**

**1.1 DESCRIPTION**

- .1 This section shall be responsible for all labour, plant, tools equipment and materials necessary for the hydronic snow and ice melting system installation as specified and as indicated on the Contract Drawings.

**1.2 STANDARD SPECIFICATIONS**

- .1 Design of hydronic snow and ice melting system in accordance to the latest edition of:
  - .1 ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
  - .2 ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials
  - .3 ASTM E814 Standard Test Method for Fire Tests of Through-Penetration Fire Stops
  - .4 ASTM F876 Standard Specification for Crosslinked Polyethylene (PEX) Tubing
  - .5 ASTM F877 Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems
  - .6 ASTM F1960 Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing

**1.3 SUBMITTALS**

- .1 Product Data: Submit manufacturer's product submittal data and installation instructions.
  - .1 Shop Drawings
    - .1 Provide installation drawings indicating tubing layout, manifold locations, zoning requirements and manifold schedules with details required for installation of the system.
  - .2 Samples: Submit selection and verification samples of piping.
  - .3 Quality Assurance and Control Submittals: Submit the following.
    - .1 Manufacturer's certificate indicating products comply with specified requirements
    - .2 Documentation indicating the installer is trained to install the manufacturer's products
  - .4 Closeout Submittals: Submit the following.
    - .1 Warranty documents specified herein
    - .2 Operation and maintenance data
    - .3 Manufacturer's field reports specified herein
    - .4 Final as-built tubing layout drawing
    - .5 Design Requirements

- .1 Standard grade hydrostatic pressure ratings from plastics pipe institute in accordance with TR-3 as listed in TR-4.

#### **1.4 PERFORMANCE REQUIREMENTS**

- .1 Provide hydronic snow and ice melting system that is manufactured, fabricated and installed to comply with regulatory agencies and authorities with jurisdiction, and maintain performance criteria stated by the PEX tubing manufacturer without defects, damage or failure.

#### **1.5 PRODUCT DELIVERY, HANDLING AND STORAGE**

- .1 Comply with manufacturers ordering instructions and lead time requirements to avoid construction delays.
- .2 Deliver materials in manufacturers original, unopened, undamaged containers with identification labels intact.
- .3 Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

#### **1.6 WARRANTY**

- .1 Submit, for the Contract Administrator's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights the City of Winnipeg may have under contract documents.

### **Part 2 Products**

#### **2.1 MANUFACTURER**

- .1 Snow and Ice Melting System:
  - .1 Uponor Inc.
  - .2 Approved equal.

#### **2.2 TUBING**

- .1 Material: Crosslinked polyethylene (PEX) manufactured by PEX-a or Engle method
- .2 Material Standard: Manufactured in accordance with ASTM F876 and ASTM F877 and tested for compliance by an independent third-party agency.
- .3 Pressure Ratings: Standard Grade hydrostatic design and pressure ratings as issued by the Plastics Pipe Institute (PPI), a division of the Society of the Plastics Industry (SPI).
- .4 Minimum Bend Radius (Cold Bending): No less than six times the outside diameter. Use the PEX tubing manufacturer's bend supports if radius is less than stated.

### **2.3 FITTINGS**

- .1 For system compatibility, use fittings offered by the PEX tubing manufacturer.
- .2 The fitting assembly must comply with ASTM F877 and CAN/CSA B137.5 requirements.
- .3 Use Uponor QS20 compression fittings or Uponor ProPEX fittings as applicable.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Comply with manufacturer's product data, including product technical bulletins, installation instructions and design drawings, including the following.
  - .1 Uponor Snow and Ice Melting Design Manual
  - .2 Uponor Radiant Floor Installation Handbook

### **3.2 EXAMINATION**

- .1 Verify that site conditions are acceptable for installation of the snow and ice melt system.
- .2 Do not proceed with installation of the snow and ice melt system until unacceptable conditions are corrected.

### **3.3 INSTALLATION**

- .1 Install in accordance with manufacturers specifications.
- .2 Fasten the tubing to flat wire mesh in accordance with the PEX tubing manufacturer's installation recommendations.
- .3 The submitted snow-melt design specifies the tubing on-center distance(s) and loop lengths. On-center distances will not exceed 12 inches (305mm).
- .4 Do not install tubing closer than 150mm from the edge of the heated slab.
- .5 Install the tubing at a consistent depth below the surface elevation as determined by the Contract Administrator. Tubing installation will ensure sufficient clearance for all control joint cuts.
- .6 Metal or plastic bend supports will be used to support the tubing when departing from the slab in a 90 degree bend.

### **3.4 FIELD QUALITY CONTROL**

- .1 To ensure system integrity, pressure test the system before covering tubing in concrete or when other trades are working in the vicinity of the tubing.

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- .2 Test all electrical controls in accordance with respective installation manuals.

### **3.5 ADJUSTING**

- .1 Balancing Across the Manifold
  - .1 Balance loops across each manifold for equal flow resistance based on actual loop lengths and total manifold flow.
  - .2 Balancing is unnecessary when all loop lengths across the manifold are within 3 percent of each other in length. Install the supply and return piping to the manifold in a reverse-return configuration to ensure self-balancing.
- .2 Balancing between manifolds is accomplished with a flow control device installed on the return piping leg from each manifold when direct return piping is used for the supply and return mains.
- .3 Adjust all boiler and system controls after the system has stabilized to ensure proper operation in accordance with the system design.
- .4 Remove temporary coverings and protection of adjacent work areas.
- .5 Repair or replace damaged installed products.
- .6 Clean installed products in accordance with manufacturer's instructions prior to the City of Winnipeg's acceptance.
- .7 Remove construction debris from project site and legally dispose of debris.

### **3.6 PROTECTION**

- .1 Protect installed work from damage caused by subsequent construction activity on the site.

**End of Section 22 83 16**