Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 55 56.14 – Hot Fluid-Applied Rubberized Asphalt Waterproofing.

1.2 REFERENCES

.1 Abbreviations and Acronyms:

.1 Cement: hydraulic cement or blended hydraulic cement (XXb - where b denotes blended).

.1 Type GU or GUb - General use cement.

.2 Reference Standards:

.1 ASTM International

.1 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.2 CSA International

.1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA A283-06(R2011), Qualification Code for Concrete Testing Laboratories.

.3 CAN/CSA A370-14, Connectors for Masonry.

.4 CAN/CSA A371-14, Masonry Construction for Buildings.

.5 CSA A3000-13, Cementitious Materials Compendium.

.6 CAN/CSA-O86-14, Engineering Design in Wood.

.7 CAN/CSA-O325-07, Construction Sheathing.

.8 CSA S269.1-1975(R2003), Falsework for Construction Purposes.

.9 CAN/CSA-S269.3-M92(R2003), Concrete Formwork, National Standard of Canada

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings: in accordance with 01 00 10 – General Instructions, convene pre-installation meeting four weeks prior to beginning concrete works.

.1 Ensure key personnel, site supervisor, Departmental Representative, speciality contractor - finishing, forming and testing laboratories attend.

.1 Verify project requirements.

.2 Special Review Coordination Meetings: in accordance with 01 00 10 – General Instructions, convene meetings with Departmental Representative and key personnel at stages noted in .3 Coordination below.

.3 Coordination.

.1 Coordinate the following sequence of related work:

.1 Special Review Meeting 1.

.2 Review of existing condition of concrete surfaces.

.3 Shallow spall repairs of concrete surfaces. Allow for 2 weeks curing time.

.4 Performance of level survey of existing conditions and of proposed levels with shop drawings submittals.

.5 Review of cleared existing concrete surfaces by Departmental Representative. Allow for one week.

.6 Special Review Meeting 2.

.7 Overlay of new concrete layer. Allow for 2 weeks curing time.

.8 Review of newly placed concrete layer by Departmental Representative. Allow for one week.

.9 Performance of water testing to verify drainage.

.10 Special Review Meeting 3.

.11 Performance of concrete adjustments.

.12 Performance of water testing to verify drainage.

.13 Installation of membrane system as specified in Section 07 55 56.14 – Hot Fluid-Applied Rubberized Asphalt Waterproofing.

.1 Performance of water testing for leakage.

.2 Special Review Meeting 4.

.3 Performance of membrane system adjustments.

.4 Performance of water testing for leakage.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 10 – General Instructions.

.2 Product Data:

.1 Curing compounds: Submit written declaration that compounds used are compatible.

.2 Submit verification of compliance that concrete supplier meets performance criteria as established in Part 2 - Products.

.3 Epoxy adhesive for dowels into concrete.

.3 Shop Drawings:

.1 Submit shop drawings of proposed slopes and depths of new concrete surfaces to attain specified drainage performance.

.4 Samples:

.1 Minimum 2 weeks prior to beginning the Work, submit the following samples:

.1 One (1) anchor dowel.

.5 Certificates:

.1 Submit valid and recognized certificate from plant delivering concrete, minimum 2 weeks prior to starting concrete work.

.2 Submit proof of certification of qualified independent inspection and testing laboratory indicated by Departmental Representative.

.6 Test and Evaluation Reports:

.1 Submit test data and certification by qualified independent inspection and testing laboratory.

.1 Submit test data reports: Concrete materials and mix designs in accordance with CSA A23.1.

.2 Submit Site Test reports as noted in Part 3 – Field Quality Control below.

.7 Field Quality Control Submittals:

.1 Submit mix design testing and inspection results and reports. Do not proceed without written approval when deviations from mix design or parameters are found.

.2 Concrete pours:

.1 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.

.8 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29 - Health and Safety Requirements.

1.5 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 00 10 – General Instructions.

.2 Valid and recognized certificate from plant delivering concrete.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.1 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

.2 Packaging Waste Management.

.1 Remove for reuse and recycling pallets, crates, padding, and packaging materials in accordance with Section 01 00 10 – General Instructions.

1.7 AMBIENT CONDITIONS

.1 Do not place concrete in the rain.

.2 Temperature range for placing concrete: minimum 10°C, maximum 32°C.

.3 Hot Weather Concreting.

.1 When ambient temperature is above 32°C or expected to rise above 32°C:

.1 Provide protection of placed concrete from effects of hot and drying weather conditions.

.2 Dispatch ready-mix trucks and organize work to keep mixing time to a minimum. Minimize exposure of mixing trucks to hot sun while waiting.

.3 Keep placing time to a minimum: provide adequate personnel and efficiently organize work.

.4 In addition to formwork providing curing: Spray formwork with water to keep it tight and free from cracking.

Part 2 Products

2.1 MATERIALS

.1 Blended hydraulic cement: Portland cement, Type GUb to CSA-A3000.

.2 Water: to CSA A23.1.

.3 Aggregates: normal density, suitable for Type GU concrete, to CSA A23.1/A23.2.

.4 Admixtures:

- .1 Air entraining admixture: to CSA-A23.1.
- .2 Chemical admixture: to CSA-A23.1.
  - .1 Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.5 Curing compound: to CSA A23.1/A23.2 and to ASTM C309 Type 1. Compatible with waterproofing membrane system.

.6 Bonding adhesive: high-performance acrylic emulsion bonding agent.

.7 Epoxy Adhesive: high strength two-part epoxy adhesive suitable for wet application.

2.2 MIXES

.1 Repair Mixes for Small Areas of Reinforced Concrete Slab:

- .1 Depth 0 – 25 mm: 1 part Portland cement, ½ part SA lime, 6 parts fine aggregate.
- .2 Depth 25 mm – 75 mm: 1 part Portland cement, ½ part SA lime, 1.5 parts fine aggregate, 3 parts coarse aggregate 12.5 mm max.

.2 Concrete Overlay Mix.

- .1 Performance Method for specifying concrete: to meet performance criteria to CSA A23.1/A23.2.
- .2 Provide concrete mix to meet following plastic state requirements:
  - .1 Uniformity: to CSA A23.1, Table 13.
  - .2 Workability: free of surface blemishes, loss of mortar, and segregation.
  - .3 Workable mix and set time to enable placement to achieve specified slopes.
- .3 Provide concrete mix to meet following hard state requirements:
  - .1 Durability and class of exposure: C-2.
  - .2 Compressive strength at 28 days: minimum 32 MPa.
  - .3 Aggregate: maximum 14 mm. Fine aggregate to CSA A23.1 Table 10 and Table 12.
    - .1 Uniformly graded.
    - .2 Mixture of sharp and rounded grains.
    - .3 Clean, hard, strong, durable, uncoated grains free from injurious amounts of dust, lumps, shale, alkali, organic matter, loam and other deleterious substances.
  - .4 Air content category: 1.

.5 Air entrainment: 5-8%.

.6 Water-cement ratio: maximum 0.45.

.7 Slump test: 60 mm, ± 20 mm.

.8 Volume stability: acceptable volume change range ±5mm due to shrinkage, creep and freeze thaw cycle.

.4 Provide quality management plan to ensure verification of concrete quality to specified performance.

.5 Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements.

2.3 FINISHES

.1 Applied finish on concrete: finish slabs and steps to meet requirements of hot fluid-applied rubberized asphalt membrane manufacturer.

2.4 ACCESSORIES

.1 Formwork materials:

.1 Use wood and wood product formwork materials to CAN/CSA-O86.

.2 Form ties:

.1 Use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes in concrete surface.

.3 Form liner:

.1 Waferboard: to CAN/CSA-O325, grade and thickness to suit application.

.4 Form release agent: non-toxic, biodegradable.

.5 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, free of kerosene, with viscosity between 15 to 24 mm^2/s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.

.6 Anchoring:

.1 Dowels: 13 mm diameter x 152 mm long, stainless steel type 316 in accordance with CSA A370.

Part 3 Execution

3.1 EVALUATION AND ASSESSMENT

.1 Identify and report immediately to Departmental Representative when concrete mix design and parameters pose anticipated problems or deficiencies related to construction.

.2 Perform level surveys of existing concrete surface conditions and of proposed new concrete levels.

.3 Allow one week for review of existing concrete surface conditions by Departmental Representative.

3.2 PROTECTION OF IN-PLACE CONDITIONS

.1 Protect remaining elements of Work from staining and damage.

3.3 SURFACE PREPARATION – CONCRETE REPAIRS

.1 Clean concrete surfaces.

- .1 Remove dirt, debris, loose concrete, existing coatings and stains.
- .2 Use gentlest means of cleaning first: soap and water, wire brush, hand tools, pressure wash, mechanical tools.
- .3 Avoid damaging adjacent surfaces.
- .4 Chemical cleaning is not permitted.

.2 Remove existing areas of spalling, cracked, delaminated and debonded concrete down to sound material.

.3 Review condition with Departmental Representative.

3.4 APPLICATION OF CONCRETE REPAIRS

.1 Perform local repairs of reinforced concrete slab as required. Allow for 5% of area.

- .1 Mark out delaminated areas and notify Departmental Representative for review.
- .2 Remove loosened concrete debris and bond-inhibiting materials.
- .3 Wash down exposed surfaces with pressurized water jet and air hose.
- .4 Provide formwork as required to suit repair, matching existing form and profile. Match adjacent surfaces.
- .5 Wet repair patch areas. Maintain concrete surface saturated surface dry for a minimum of 24 hours prior to placing concrete.
- .6 Keep work areas clean and protect exposed concrete from water.
- .7 Provide Departmental Representative with minimum 48 hours' notice prior to placing of concrete.
- .8 Bond coat on concrete repair area: Brush cement slurry bonding agent onto cleaned concrete surface.
- .9 Mix patching material with selected blend of aggregates.
- .10 While cement slurry bonding agent is still tacky:
  - .1 Fill repair area with concrete repair mix to appropriate surface depth.
- .11 Wet cure spall repair: minimum 4 days.
- .12 Cover repaired surfaces of concrete with single layer of clean, pre-soaked burlap.
- .13 Keep fabric wet with soaker hoses.

.2 Scarify exposed existing concrete surface.

.3 Clean scarified surface: remove loose and friable materials.

3.5 INSTALLATION OF DOWELS

.1 Install masonry anchors in accordance with CAN/CSA A370 and CAN/CSA A371 unless indicated otherwise.

.2 Install dowel anchoring where indicated on Contract Drawings.

.3 Position and adjust each anchor to suit condition and requirements at each installation location.

.4 Place stainless steel dowels and pack solidly with epoxy adhesive to anchor and hold dowels in positions as indicated.

3.6 PREPARATION – NEW CONCRETE OVERLAY

.1 Surface preparation.

.1 Clean concrete surface: remove loose and friable materials.

.2 Apply bonding agent.

3.7 FABRICATION AND ERECTION OF FORMWORK

.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

.2 Fabricate and erect falsework in accordance with CSA S269.1.

.3 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.

3.8 INSTALLATION

.1 Do cast-in-place concrete work in accordance with CSA A23.1/A23.2.

.2 Verify levels as overlay of new concrete is proceeding.

.3 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.4 Ensure inserts are not disturbed during concrete placement.

.5 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.

3.9 PLACING CONCRETE

.1 Obtain Departmental Representative's written approval before placing concrete.

.1 Provide 48 hours minimum notice prior to placing of concrete.

.2 Wet scarified existing concrete. Remove excess water from concrete placement area.

.3 Place concrete in accordance with CSA-A23.1.

.1 Do not add water to concrete mix without obtaining Departmental Representative’s written approval.

.4 Time from charging mixer to final deposit.

.1 Maximum average time: 60 minutes.

.2 Maximum individual time: 90 minutes.

.5 Clean and remove stains prior to application of concrete finishes.

3.10 FINISHING AND CURING

.1 Finish concrete to CSA A23.1/A23.2.

.2 Provide slopes as indicated on Contract Drawings. Use procedures in accordance with CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.

.3 Use curing compounds compatible with applied finish on concrete surfaces.

.4 Apply finish on concrete.

.5 Protect newly placed concrete from rain and other adverse weather conditions until final set occurs.

.6 Curing time: allow for 2 weeks.

.7 Do not place load upon new concrete until authorized by Departmental Representative.

.8 Allow one week for review of newly placed concrete surface by Departmental Representative.

3.11 REMOVAL AND RESHORING OF FORMWORK

.1 Remove formwork when concrete has reached 70 % of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate re-shoring.

.2 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

3.12 FIELD QUALITY CONTROL

.1 Field Surveys, Inspections and Tests.

.1 Perform level surveys of existing concrete surface conditions and of proposed new concrete levels.

.2 Review of cleared existing concrete surface conditions by Departmental Representative.

.3 Continual verification of new concrete levels as overlay is proceeding.

.4 Water testing in accordance with Coordination in Article 1.4 Administrative Requirements above, and in accordance with Article 3.10 Water Flow Testing below.

.2 Site tests: conduct tests as follows in accordance with Section 01 00 10 – General Instructions and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.1 Concrete pours: indicate date, location of pour, quality, air temperature and test samples taken.

.2 Slump.

.3 Air content.

.4 Compressive strength at 7 and 28 days.

.5 Air and concrete temperature.

.3 Engage testing laboratory firm for inspection and testing of concrete and concrete materials for review to CSA A23.1/A23.2.

.1 Ensure testing laboratory is certified to CSA A283.

.4 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and Departmental Representative.

3.13 WATER FLOW TESTING

.1 Leave concrete exposed until inspection of testing is completed and reviewed by Departmental Representative.

.2 Flood area to be tested.

.3 Record drainage directions of water over concrete surfaces.

.4 Confirm water flows across new concrete surfaces, down steps and exits through drains.

.5 If water ponds on surface, re-slope, repair and retest.

.6 Remove water at end of test.

3.14 CLEANING

.1 Clean in accordance with Section 01 00 10 – General Instructions.

.2 Construction Waste Management.

.1 Separate waste materials for reuse and recycling in accordance with Section 01 00 10 – General Instructions.

.2 Divert unused concrete materials from landfill to local facility after receipt of written approval from Departmental Representative.

.3 Divert unused admixtures and additive materials from landfill to official hazardous material collections site as approved by Departmental Representative.

.4 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

.5 Prevent admixtures and additive materials from entering drinking water supplies or streams.

.6 Using appropriate safety precautions, collect liquid or solidify liquid with inert, non-combustible material and remove for disposal.

.7 Dispose of waste in accordance with applicable local, Provincial and National regulations.

END OF SECTION