

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 20 00 - Concrete Reinforcing
- .2 Section 03 30 00 - Cast-in-Place Concrete
- .3 Section 03 30 03 - Concrete Repair

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA-O86-09, Engineering Design in Wood.
 - .3 CAN/CSA O121-08 (R2013), Douglas Fir Plywood.
 - .4 CAN/CSA O151-09, Canadian Softwood Plywood.
 - .5 CAN/CSA O153-13, Poplar Plywood.
 - .6 CAN/CSA-O325-07 (R2012), Construction Sheathing.
 - .7 CAN/CSA O437 Series-93 (R2011), Standards on OSB and Waferboard Forest Products.
 - .8 CAN/CSA S269.1-1975 (R1998), Falsework for Construction Purposes.
 - .9 CAN/CSA-S269.3-M92 (R2008), Concrete Formwork
- .2 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .3 Ministry of Transport of Québec
 - .1 Norme 31001-2008, Doublure de coffrage

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings for formwork and falsework.
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .4 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, and materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CAN/CSA S269.1, for falsework drawings. Comply with CAN/CSA-S269.3 for formwork drawings.
- .5 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

- .6 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Place materials defined as hazardous or toxic in designated containers.
 - .3 Divert wood materials from landfill to a reuse facility as approved by Departmental Representative.
 - .4 Divert plastic materials from landfill to a recycling facility as approved by Departmental Representative.
 - .5 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Formwork materials:
 - .1 For concrete without special architectural features, use wood and wood product formwork materials to CAN/CSA-O151.
 - .2 For concrete with special architectural features, use formwork materials to CAN/CSA-A23.1/A23.2.
 - .3 Rigid insulation board: to CAN/ULC-S701.
- .2 Form ties:
 - .1 Support vertical faces of formwork by means of metal form ties provided with plastic cones screwed to their extremities; length of cone chosen to provide required reinforcement cover.
 - .2 Place form ties so as not to interfere with concrete placing and in a vertical line, perpendicular to face of concrete.
 - .3 Form ties must be in contact with concrete along entire length.
 - .4 For curbs, sidewalks, bicycle paths and barriers, no form ties may be placed in concrete to retain vertical panels of formwork. Support formwork from exterior to ensure stability and integrity.
- .3 Form liner:
 - .1 Draining material composed generally of a cloth or a geotextile, stretched over the interior surface of formwork with the objective of diminishing the formation of bug holes or voids at the concrete surface, to MTQ Standard 31001.
- .4 Form release agent: non-toxic.
- .5 Falsework materials: to CAN/CSA-S269.1.

Part 3 Execution

3.1 FABRICATION AND ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Fabricate and erect falsework in accordance with CAN/CSA S269.1.
- .5 Refer to architectural drawings for concrete members requiring architectural exposed finishes.
- .6 Do not place shores and mud sills on frozen ground.
- .7 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .8 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 CAN/CSA-A23.1/A23.2.
- .9 Cover the interior surface of formwork for barriers (side facing sidewalk and side facing lanes) with form liner. Protect formwork panels covered with form liner from weather and keep clean from dirt, earth, paint, and oil until concrete has been poured.
- .10 Align form joints and make watertight.
 - .1 Keep form joints to minimum.
- .11 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.
- .12 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .13 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
 - .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .14 Clean formwork in accordance with CAN/CSA-A23.1/A23.2, before placing concrete.

3.2 REMOVAL AND RESHORING

- .1 Leave formwork in place for following minimum periods of time after placing concrete.
 - .1 3 days for repairs to abutments and retaining walls;
 - .2 3 days for repairs of soffit.
 - .3 3 days for approach slabs and repairs to ends of beams.
- .2 Remove formwork when concrete has reached 70 % of its design strength or minimum period noted above, whichever comes later.
- .3 Re-use formwork and falsework subject to requirements of CAN/CSA-A23.1/A23.2.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 10 00 - Concrete Forming and Accessories
- .2 Section 03 30 00 - Cast-in-Place Concrete
- .3 Section 03 30 03 - Concrete Repair

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - .2 ASTM A123-12, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - .3 ASTM A143/A143M-07, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
- .2 CSA International
 - .1 CAN/CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CAN/CSA-A23.3-04 (R2010), Design of Concrete Structures.
 - .3 CAN/CSA S6-06 (R2013), Canadian Highway Bridge Design Codes
 - .4 CAN/CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
 - .5 CAN/CSA-G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .6 CAN/CSA W186-M1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .3 Reinforcing Steel Institute of Canada (RSIC)
 - .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .1 Indicate placing of reinforcement and:
 - .1 Bar bending details.
 - .2 Lists.
 - .3 Quantities of reinforcement.

- .4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.
- .2 Detail lap lengths and bar development lengths to CAN/CSA S6.

1.4 QUALITY ASSURANCE

- .1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.
 - .1 Mill Test Report: provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum 2 weeks prior to beginning reinforcing work.
 - .2 Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .4 Develop Waste Reduction Workplan related to Work of this Section.

Part 2 Products

2.1 MATERIALS

- .1 Substitute different size bars only if permitted in writing by Departmental Representative.
- .2 Reinforcing steel: weldable low alloy steel, grade 400 deformed bars to CAN/CSA-G30.18.
- .3 Cold-drawn annealed steel wire ties: to ASTM A82/A82M.
- .4 Welded steel wire fabric: to ASTM A185/A185M.
 - .1 Provide in flat sheets only.
- .5 Galvanizing of non-prestressed reinforcement: to ASTM A123, minimum zinc coating 610 g/m².
 - .1 Protect galvanized reinforcing steel with chromate treatment to prevent reaction with Portland cement paste.
 - .2 If chromate treatment is carried out immediately after galvanizing, soak steel in aqueous solution containing minimum 0.2% by weight sodium dichromate or 0.2% chromic acid.

- .1 Temperature of solution equal to or greater than 32 degrees and galvanized steels immersed for minimum 20 seconds.
- .3 If galvanized steels are at ambient temperature, add sulphuric acid as bonding agent at concentration of 0.5% to 1.0%.
 - .1 In this case, no restriction applies to temperature of solution.
- .4 Chromate solution sold for this purpose may replace solution described above, provided it is of equivalent effectiveness.
 - .1 Provide product description as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .6 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1/A23.2.
- .7 Mechanical splices: subject to approval of Departmental Representative.
- .8 Plain round bars: to CAN/CSA-G40.20/G40.21.

2.2 FABRICATION

- .1 Fabricate reinforcing steel in accordance with Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Upon approval of Departmental Representative, weld reinforcement in accordance with CAN/CSA W186.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 SOURCE QUALITY CONTROL

- .1 Provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 2 weeks prior to beginning reinforcing work.
- .2 Upon request inform Departmental Representative of proposed source of material to be supplied.

Part 3 Execution

3.1 PREPARATION

- .1 Galvanizing to include chromate treatment.
 - .1 Duration of treatment to be 1 hour per 25 mm of bar diameter.
- .2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

3.2 FIELD BENDING

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying slow and steady pressure.

- .3 Replace bars, which develop cracks or splits.

3.3 PLACING REINFORCEMENT

- .1 Place reinforcing steel as indicated on placing drawings in accordance with CAN/CSA-A23.1/A23.2.
- .2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .3 Ensure cover to reinforcement is maintained during concrete pour.

3.4 FIELD TOUCH-UP

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

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 10 00 - Concrete Forming and Accessories
- .2 Section 03 20 00 - Concrete Reinforcing
- .3 Section 03 30 03 - Concrete Repair

1.2 MEASUREMENT AND PAYMENT

- .1 Construction of barriers will be paid based on the actual quantities measured on site and the unit prices stated in the Bid and Acceptance Form:
 - .1 Construction of barriers will be paid by the linear meter for each side. Unit price includes costs of concrete, formwork, reinforcing, chemical anchorages, rails, nuts, washers, bolts, anchor bolts, grout, demolition of existing barriers and transitions between existing barriers and new barriers. Unit price also includes cost of removing, storing, and reinstalling roadway lighting and supply, installation, and testing of electrical conduits to supply current to roadway lighting.
- .2 Concrete repairs:
 - .1 To be paid as specified in Section 03 30 03 - Concrete Repair.
- .3 All other work to which this Section applies is to be paid as part of the Lump Sum Amount of the Bid and Acceptance Form. Such work includes but is not limited to:
 - .1 Approach slabs.
 - .2 Encasement of ducts.
 - .3 Filling of void under sidewalk southeast of OHEPC bridge.

1.3 REFERENCES

- .1 Abbreviations and Acronyms:
 - .1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement.
 - .1 Type GU, GUb and GUL - General use cement.
 - .2 Type MS and MSb - Moderate sulphate-resistant cement.
 - .3 Type MH, MHb and MHL - Moderate heat of hydration cement.
 - .4 Type HE, HEb and HEL - High early-strength cement.
 - .5 Type LH, LHb and LHL - Low heat of hydration cement.
 - .6 Type HS and HSb - High sulphate-resistant cement.
 - .2 Fly ash:
 - .1 Type F - with CaO content less than 15%.
 - .2 Type CI - with CaO content ranging from 15 to 20%.
 - .3 Type CH - with CaO greater than 20%.
 - .3 GGBFS - Ground, granulated blast-furnace slag.

.2 Reference Standards:

.1 ASTM International

- .1 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
- .2 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .3 ASTM C494/C494M-13, Standard Specification for Chemical Admixtures for Concrete.
- .4 ASTM C1017/C1017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
- .5 ASTM D412-06a (2013), Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
- .6 ASTM D624-00 (2012), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
- .7 ASTM D1751-04 (2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- .8 ASTM D1752-04a (2008), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
- .2 CAN/CGSB-51.34-M86 (R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 CSA International

- .1 CAN/CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CAN/CSA A283-06 (R2011), Qualification Code for Concrete Testing Laboratories.
- .3 CAN/CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-installation Meetings: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart, convene pre-installation meeting 1 week prior to beginning concrete works.
 - .1 Ensure site supervisor, Departmental Representative, and testing laboratories attend.
 - .1 Verify project requirements.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

- .2 At least 2 weeks prior to beginning Work, provide Departmental Representative with samples of materials proposed for use as follows:
 - .1 3 kg of each type of supplementary cementing material.
 - .2 10 kg of each type of blended hydraulic cement.
 - .3 5 kg of each admixture.
 - .4 2 kg of each fine and coarse aggregate.
- .3 Provide testing reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.
- .4 Concrete pours: provide 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: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.
- .6 Provide 2 copies of WHMIS MSDS in accordance with 01 35 43 - Environmental Procedures.

1.6 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Provide Departmental Representative, minimum 2 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.
 - .1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.
 - .2 Provide a valid RMCAO Certificate of Ready Mixed Concrete Production Facilities as issued by the Ready Mixed Concrete Association of Ontario, or a Certificate of conformity from the Bureau de Normalisation du Québec in relation to the certification protocol NQ 2621-905/2002 Bétons de masse volumique normale et constituants.
- .3 Minimum 2 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:
 - .1 Falsework erection.
 - .2 Hot weather concrete.
 - .3 Cold weather concrete.
 - .4 Curing.
 - .5 Finishes.
 - .6 Formwork removal.
 - .7 Joints.
- .4 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and Acceptance Requirements:
 - .1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
 - .1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CAN/CSA A23.1/A23.2.
 - .2 Deviations to be submitted for review by Departmental Representative.
 - .2 Concrete delivery: ensure continuous concrete delivery from plant meets CAN/CSA A23.1/A23.2.
- .2 Packaging Waste Management: remove for reuse and return of pallets, crates, and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.8 SITE CONDITIONS

- .1 Place concrete at temperatures limits to CAN/CSA-A23.1/A23.2.
- .2 Do not place concrete:
 - .1 When air temperature is above 22 degrees C.
 - .2 During rain or excessive wind or dust.
 - .3 When conditions, as reviewed by Departmental Representative seem detrimental to concrete.
- .3 When air temperature falls below 5 degrees C, comply with cold weather requirements

Part 2 Products

2.1 DESIGN CRITERIA

- .1 Alternative 1 - Performance : to CAN/CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2.2 PERFORMANCE CRITERIA

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

2.3 MATERIALS

- .1 Portland Cement: to CAN/CSA A3001, Type GU.
- .2 Blended hydraulic cement: Type GUB to CAN/CSA A3001.
- .3 Portland-limestone cement: Type GUL to CAN/CSA A23.1.
- .4 Supplementary cementing materials: to CAN/CSA A3001 with following requirements
 - .1 Minimum 15% fly ash replacement by mass of total cementitious materials.
 - .2 Minimum 5% silica fume

- .3 Maximum 30% replacement by mass of total cementitious materials.
- .5 Water: to CAN/CSA A23.1.
- .6 Aggregates: to CAN/CSA A23.1/A23.2.
- .7 Admixtures:
 - .1 Air entraining admixture: to ASTM C260.
 - .2 Chemical admixture: to ASTM C494. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .8 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents to CAN/CSA A23.1/A23.2.
 - .1 Compressive strength: 35 MPa at 28 days.
 - .2 Net shrinkage at 28 days: maximum 0.08 %.
- .9 Non premixed dry pack grout: composition of non metallic aggregate cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 35 MPa at 28 days.
- .10 Curing compound: to CAN/CSA A23.1/A23.2.
- .11 Premoulded joint fillers:
 - .1 Bituminous impregnated fibre board: to ASTM D1751.
- .12 Weep hole tubes: plastic.
- .13 Polyethylene film: 0.15 mm thickness to CAN/CGSB-51.34.

2.4 MIXES

- .1 Alternative 1 - Performance Method for specifying concrete: to meet performance criteria to CAN/CSA A23.1/A23.2.
 - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.
 - .2 Provide concrete mix to meet following plastic state requirements:
 - .1 Workability: free of surface blemishes.
 - .3 Provide 35 MPa concrete mix to meet following hard state requirements:
 - .1 Durability and class of exposure: C-1.
 - .2 Compressive strength at 28 days age: 35 MPa minimum.
 - .3 Intended application: repairs and barriers.
 - .4 Aggregate size 20 mm maximum.
 - .5 Pre-Qualification: supply air entrainment, slump, and temperature results from past use of proposed mix.
 - .4 Provide 20 MPa concrete mix to meet following hard state requirements:
 - .1 Durability and class of exposure: F-2.
 - .2 Compressive strength at 28 days age: 20 MPa minimum.
 - .3 Intended application: concrete encasement of ducts in trenches.
 - .4 Coarse aggregate size: pea gravel.

- .5 Pre-Qualification: supply air entrainment, slump, and temperature results from past use of proposed mix.
- .5 Provide quality management plan to ensure verification of concrete quality to specified performance.
- .6 Concrete supplier's certification: both batch plant and materials meet CAN/CSA A23.1 requirements.

Part 3 Execution

3.1 PREPARATION

- .1 Obtain Departmental Representative's written approval before placing concrete.
 - .1 Provide 24 hours minimum notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .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 Departmental Representative'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 shrinkage compensating grout or epoxy grout to anchor and hold dowels in positions as indicated.
- .11 Do not place load upon new concrete until authorized by Departmental Representative.
- .12 Immediately prior to placing concrete, thoroughly wet down substrates with clean water.

3.2 INSTALLATION/APPLICATION

- .1 Do cast-in-place concrete work to CAN/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 Departmental Representative.

- .2 Where approved by Departmental Representative, 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 Departmental Representative.
- .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.
- .5 Confirm 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 Drainage holes and weep holes:
 - .1 Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.
 - .2 Install weep hole tubes and drains as indicated.
- .4 Finishing:
 - .1 Finish concrete to CAN/CSA A23.1/A23.2.
 - .2 Use procedures as reviewed by Departmental Representative to remove excess bleed water. Ensure surface is not damaged.
 - .3 Finish:
 - .1 Sidewalks : broomed finish
 - .2 Repairs to soffit, abutments, retaining walls: rough-form finish.
 - .3 Approach slabs: rough-form finish.
 - .4 Unless noted otherwise: smooth-formed finish.
- .5 Joint fillers:
 - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative.
 - .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 expansion joints as indicated.
 - .4 Install joint filler.

3.3 SURFACE TOLERANCE

- .1 Ensure smooth, continuous, and uniform surfaces.

3.4 PROTECTION

- .1 Protection and curing for concrete placed between October 15th and April 1st comply with following requirements in addition to cold weather requirements of CAN/CSA-A23.1/A23.2.
 - .1 Protect concrete with windproof shelter of canvas or other material to allow free circulation of inside air around fresh concrete.
 - .2 Do not let walls of shelter touch formwork.

- .3 Provide sufficient space for removal of formwork for finishing.
- .4 Use heating equipment approved by Departmental Representative.
- .5 Vent products of combustion outside protective shelter: equipment to be capable of keeping inside air at constant temperature sufficiently high to maintain concrete at following curing temperatures:
 - .1 For initial 3 days: minimum temperature of 15 degrees C, maximum of 27 degrees C at concrete surfaces.
 - .2 For concrete abutments, solid piers, footings: cure at 10 degrees C for additional 4 days.
 - .3 For superstructure: maintain concrete at minimum 10 degrees C for additional 14 days.
- .6 Keep concrete surfaces continually moist while protected.
- .7 Provide fogging equipment to allow for mist spray curing before start of bridge deck pour.
- .2 Unformed surfaces: cure with burlap and water.
 - .1 Place two layers of damp burlap on surface of concrete.
 - .2 Overlap each strip by minimum 75 mm and secure against displacement by wind.
 - .3 Maintain burlap in place and keep thoroughly wet for seven days after placement.
- .3 Formed surfaces:
 - .1 No additional curing will be required if formwork is left in place for seven days or more.
 - .2 If formwork removed in less than seven days, cure in manner specified for unformed surfaces for remainder of seven day period.
- .4 During curing period, only uncover areas needed for finish treatment. Re-cover and continue curing.

3.5 FIELD QUALITY CONTROL

- .1 Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
 - .1 Concrete pours.
 - .2 Slump.
 - .3 Air content.
 - .4 Compressive strength at 7 and 28 days.
 - .5 Air and concrete temperature.
- .2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Departmental Representative for review to CAN/CSA A23.1/A23.2.
 - .1 Ensure testing laboratory is certified to CAN/CSA A283.
- .3 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and Departmental Representative.

- .4 Departmental Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .5 Non-Destructive Methods for Testing Concrete: to CAN/CSA A23.1/A23.2.

3.6 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Prepare Waste Reduction Workplan plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Divert unused concrete materials from landfill to local facility after receipt of written approval from Departmental Representative.
 - .3 Provide appropriate area on job site where concrete trucks and be safely washed.
 - .4 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by Departmental Representative.
 - .5 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.
 - .6 Prevent admixtures and additive materials from entering drinking water supplies or streams.
 - .7 Using appropriate safety precautions collect liquid or solidify liquid with inert, non-combustible material and remove for disposal.
 - .8 Dispose of waste in accordance with applicable local, Provincial, and National regulations.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 02 41 16 - Structure Demolition
- .2 Section 03 10 00 - Concrete Forming and Accessories
- .3 Section 03 20 00 - Concrete Reinforcing
- .4 Section 03 30 00 - Cast-in-Place Concrete

1.2 MEASUREMENT AND PAYMENT

- .1 Repairs will be paid based on the actual quantities measured on site and the unit prices stated in the Bid and Acceptance Form:
 - .1 Repairs to concrete will be paid by the square metre. Unit price includes demolition and preparation of surface, addition of reinforcement where indicated, supply and placement of concrete, formwork, curing, stripping, correction of faulty repairs.
 - .2 Crack injection will be paid by the linear metre of crack injected, measured from first injection port to last injection port. Unit price includes supply of crack injection work plan, products and equipment, cleaning of surfaces, placement and removal of sealing product, and testing.
- .2 Construction of barriers:
 - .1 To be paid as specified in Section 03 30 00 - Cast-in-Place Concrete.
- .3 All other work to which this Section applies is to be paid as part of the Lump Sum Amount of the Bid and Acceptance Form. Such work includes but is not limited to:
 - .1 Modifications to ends of deck.

1.3 REFERENCES

- .1 All concrete repair work must be executed, unless otherwise noted, conforming with the following standards:
 - .1 CSA International:
 - .1 CAN/CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA 269.1-1975 (R1998), Falsework for Construction Purposes
 - .3 CAN/CSA S269.3-M92 (R2008), Formwork
 - .4 CAN/CSA G30.18-09, Billet Steel Bars for Concrete reinforcement
 - .5 CAN/CSA G30.3-M1983 (R1998), Cold Drawn Steel Wire for Concrete Reinforcement
 - .6 CAN/CSA G30.5-M1983 (R1998), Welded Steel Wire Fabric for Concrete Reinforcement
 - .7 CAN/CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

- .2 American Concrete Institute:
 - .1 ACI 304.2R-96, Placing Concrete by Pumping Methods
 - .2 ACI 546.1.R-80, Guide to Repair of Concrete Bridge Superstructures.
- .3 ASTM International
 - .1 ASTM E488/E488M-10, Standard Test Methods for Strength of Anchors in Concrete Elements.
- .4 Ministry of Transport of Québec:
 - .1 Liste des matériaux relatifs au béton éprouvés par le laboratoire des chaussées, 2012.
- .5 Ministry of Transportation of Ontario:
 - .1 Designated Sources of Material, 2013.

1.4 DOCUMENTS/SAMPLES TO SUBMIT

- .1 Submit documents and samples required conforming to Section 01 33 00 - Submittal Procedures to Departmental Representative minimum 10 days before the start of Work.
- .2 Supply crack injection work plan with detailed description of product, equipment, and method of injection proposed. Include technical data sheets of products and equipment, the model and series number of the manometer, along with a calibration certificate no more than 12 months old.

1.5 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Chemical anchors:
 - .1 Before starting installation of chemical anchors, install three (3) test dowels with chemical anchors at locations indicated by Departmental Representative.
 - .2 Test pull-out resistance of chemical anchors to ASTM E488 in presence of Departmental Representative.
 - .3 If pull-out resistance of anchors less than yield strength indicated on plans, modify anchorage method and perform pull-out testing on new anchors.
 - .4 Repair concrete surfaces damaged during pull-out tests.

1.6 SITE CONDITIONS

- .1 Site in channel area will not be dry. Ensure suitable dryness for demolition, placing patch material, curing, and crack injection by means such as cofferdams, sandbags, pumps. Keep equipment in readiness in case weather conditions rapidly increase water infiltration.
- .2 Crack injection must not be performed when temperature of concrete is less than 15°C or greater than 30°C.

Part 2 Products

2.1 MATERIALS

- .1 Portland Cement: to CAN/CSA A3000, Type GU.

- .2 Water: to CAN/CSA A23.1.
- .3 Aggregates: to CAN/CSA A23.1/A23.2.
- .4 Dry packed grout: product containing Portland cement base with non-metallic, non-shrink aggregates and sufficient water to hold its form when formed into a ball by hand, capable of attaining a compressive resistance of 35 MPa at 28 days.
- .5 Bonding agent:
 - .1 Bonding agent on existing concrete before pour of fresh concrete: a mix of latex, cement, and water with following proportions:
 - .1 3 kg cement Type GU
 - .2 7.5 litre latex
 - .3 Approximately 2.5 litre of water just enough to obtain creamy consistency.
- .6 Crack injection product:
 - .1 Cracks in soffit: epoxy.
 - .2 Cracks elsewhere: polyurethane.
 - .3 Included on list of "Produit d'injection des fissures" of Liste des matériaux relatifs au béton éprouvés par le laboratoire des chaussées.
 - .4 Injection product must be less than 12 months old.
 - .5 Deliver injection product in original sealed containers marked with date of fabrication.
- .7 Chemical anchors:
 - .1 Use two-component injectable adhesive for installation of all reinforcing steel dowels into existing concrete.
 - .2 Minimum compressive strength: 50 MPa.
 - .3 Included on list of "Dowel Adhesives" of Designated Sources of Material.

2.2 EQUIPMENT

- .1 Permitted demolition equipment:
 - .1 Demolition of concrete of hollow-core slabs or within 150 mm of conduits:
 - .1 Type of hammer: pneumatic or manual
 - .2 Maximum mass: 7 kg
 - .3 Hammer tip: spade
 - .2 Demolition of other concrete:
 - .1 Type of hammer: pneumatic or manual
 - .2 Maximum mass: 15 kg
- .2 Crack injection equipment:
 - .1 Use equipment in good order and consisting of pumps with pistons, electric or pneumatic, with maximum pressure of around 1 300 kPa. Mixing chamber must be located just before injection nozzle with the manometer located after mixing chamber. Equipment size must be such that it may be located on scaffolding and in the immediate proximity of cracks to be injected.

- .3 Chemical anchor equipment:
 - .1 Use only injection tools and mixing nozzles as recommended by manufacturer of adhesive.

Part 3 Execution

3.1 GENERAL

- .1 Before start of work, Departmental Representative will determine and delimit, in presence of Contractor, the locations of concrete to demolish.
- .2 Provide Departmental Representative with safe equipment and access necessary to permit him to determine surface to demolish and to verify repaired surfaces.

3.2 DEMOLITION

- .1 Take precautions necessary to avoid damage to parts of the structure to be preserved during concrete demolition. To that end, pneumatic hammers are restricted to those authorised in clause 2.2.1.
- .2 Before start of Work, provide Departmental Representative with technical specifications of proposed equipment as well as of the proposed protection measures.
- .3 Before starting demolition, saw cut the concrete approximately 20 mm deep to delimit the zone of repair for all types of demolition. Take all necessary precautions to ensure that saw cut does not encounter reinforcement.
- .4 If, by lack of care, reinforcement to be preserved is damaged and is not suitable for reuse, replace such reinforcement at Contractor's expense.
- .5 Clean demolished surfaces by pressure washing with water. Cleaning must remove small elements of concrete not adhering perfectly to the surface, to obtain a rough surface suitable for the new concrete.
- .6 After final cleaning of the demolished surfaces by pressure washing, Departmental Representative will examine state of remaining concrete to ensure that there are no loose elements.

3.3 PREPARATION OF SURFACES

- .1 Clean and remove loose or friable particles from cleared surfaces.
- .2 Cleared surfaces must be approved by Departmental Representative before placing concrete.
- .3 Keep surfaces damp for at least 8 hours before placing concrete and remove all standing water. Surfaces must be saturated surface dry before placing concrete.

3.4 APPLICATION OF BONDING AGENT

- .1 Where required by Departmental Representative, apply a coating of bonding agent described in clause 2.1.5 to ensure bond between new concrete and that left in place. If bonding agent has dried before placing concrete, clean the concrete surface with a jet of water and apply a new coating of bonding agent.

3.5 INSTALLATION/APPLICATION

- .1 Supply ready-mix concrete fabricated in a concrete plant, transported and discharged at the Site conforming to section 18 of CAN/CSA A23.1.
- .2 Require the concrete supplier to provide a delivery slip with each load of concrete and transfer a copy of this slip to Departmental Representative. The following information must appear on each delivery slip:
 - .1 Company name and address
 - .2 Truck number
 - .3 Name of Contractor
 - .4 Name and location of project
 - .5 Class of concrete
 - .6 Total quantity of concrete
 - .7 Start of discharge
 - .8 End of discharge
 - .9 Maximum aggregate size
 - .10 Percentage of entrained air
 - .11 Admixtures used
 - .12 Quantity and type of cement
 - .13 Quantity of water
- .3 Follow requirements of section 20 of CAN/CSA A23.1 for construction joints. Provide construction joints with keys along their entire length and with a depth equal to a sixth of their thickness to a maximum of 100 mm. Batter lightly the sides of keys.

3.6 FINISHING AND CURING

- .1 Protect and cure concrete in conformance with section 21 of CAN/CSA A23.1. In cold weather, protect the concrete. The use of curing compounds is forbidden
- .2 Non-formed concrete surfaces:
 - .1 Unless noted otherwise, finish non-formed concrete surfaces as required by section 22 of CAN/CSA A23.1
- .3 Formed concrete surfaces:
 - .1 Finish formed concrete surfaces as required by section 24 of CAN/CSA A23.1.
 - .2 Fill holes left by form supports with a non-shrink mortar. Fill only the hole without staining the surrounding concrete.

3.7 REPAIRS

- .1 Remove and replace all damaged or defective concrete with concrete satisfying to requirements of plans and specifications and as directed by the Departmental Representative.
- .2 After removing formwork, voids, bugholes, and other defects will be examined by Departmental Representative. Submit for Departmental Representative's approval methods of repair proposed for voids, bugholes, and other defects that may exist. Do not

proceed to correction of surfaces before receiving authorisation from Departmental Representative.

3.8 CRACK INJECTION

- .1 Seal cracks by injecting under pressure.
- .2 Inject entire length of cracks with an opening greater or equal to 0.8 mm or as indicated by Departmental Representative.
- .3 Perform crack injection in conformance with crack injection work plan.
- .4 Provide Departmental Representative with written notice:
 - .1 At least 24 hours before start of crack injection.
 - .2 At least 24 hours before resumption of crack injection if injection has been suspended for at least 24 hours.
- .5 Clean surfaces adjacent to cracks with a steel brush to free them of dirt, oil, efflorescence and other foreign matter.
- .6 Seal cracks by injecting injection product into injection ports.
- .7 Injection ports:
 - .1 Attach perpendicular to face of concrete, without drilling into concrete
 - .2 Space injection ports at distance no greater than thickness of element, and at locations where crack is clean and at greatest width.
 - .3 Spacing of first and last injection ports to be half of regular spacing.
 - .4 Use at least two injection ports per crack.
 - .5 Cover cracks between injection ports with sealing product to width not less than 50 mm.
 - .6 Test seal of injection ports and crack by injection compressed air at 500 kPa. If air pressure falls within a minute after injection, replace defective material and repeat test until pressure is maintained. Use equipment for air injection furnished with filter to capture oil.
- .8 Engineer responsible for preparing crack injection work plan must be present for injection of first crack to verify Work is conducted in conformance with crack injection work plan.
- .9 Inject remaining cracks only demonstrating to satisfaction of Departmental Representative that first crack is properly injected.
- .10 Inject vertical or inclined cracks starting from the lowest injection port. Inject horizontal cracks starting from one end.
- .11 Verify that injection pressure at nozzle is less than 345 kPa.
- .12 Injection process:
 - .1 Inject crack in continuous fashion.
 - .2 Inject first injection port until injection product no longer flowing and maximum pressure is maintained for at least 10 minutes.
 - .3 Close injection ports when injection product begins to leak out.

- .4 After at least 10 minutes with constant pressure and no flow at first injection port, proceed to inject furthest port from which injection product has leaked out.
- .5 Repeat process until injection product has filled all injection ports.
- .13 Stop injection and clean all equipment and accessories if injection halts for more than 75% of pot life.
- .14 If micro cracks appear close to crack being injected, stop injection immediately.
- .15 Stop injection and correct crack seal immediately if crack begins to leak product other than at injection ports.
- .16 Remove sealing product, injection ports and all spills, leaks or splashes of injection product to the surface of existing concrete once injection product has hardened sufficiently, but not less than 24 hours after completion of injection.

3.9 CHEMICAL ANCHORS

- .1 Drill holes to depths specified by manufacturer of chemical anchor adhesive for yield strength indicated on plans in 31 MPa concrete.
- .2 Minimum depth of hole: 200 mm.
- .3 Drill holes on vertical faces inclined 15° to the horizontal, descending from orifice.
- .4 Brush holes clean and blow dry with jet of compressed air immediately before injecting chemical anchor adhesive. Insert hose of air jet into hole.
- .5 Inject chemical anchor adhesive to bottom of hole. Inject sufficient quantity to entirely fill annulus between dowel and holes over entire length of hole.
- .6 Insert clean and grease-free dowel to the bottom of hole.
- .7 Prevent disturbance of dowel during curing period.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 07 13 52 - Modified Bituminous Sheet Waterproofing.

1.2 REFERENCES

- .1 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 At least 2 weeks prior to beginning Work, provide Departmental Representative with product data for corrosion inhibitor proposed for use including:
 - .1 Manufacturer's instructions.
 - .2 Printed product literature and data sheets.
 - .3 Product characteristics and limitations.
 - .4 Performance criteria.
 - .5 Finish.
 - .6 Independent test reports regarding use for rehabilitation of bridge decks.
 - .7 Description of five bridge deck rehabilitation projects completed in the last ten years using proposed corrosion inhibitor, with at least one such project in Canada.
 - .8 Letter from manufacturer certifying compatibility with waterproofing of Section 07 13 52 - Modified Bituminous Sheet Waterproofing.
- .3 Provide 2 copies of WHMIS MSDS in accordance with 01 35 43 - Environmental Procedures.

1.4 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Perform site trial of application over 4 m² area selected by Departmental Representative.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Order materials only after receiving written instruction from the Departmental Representative.
- .2 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .3 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .4 Storage and Handling Requirements:

- .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Replace defective or damaged materials with new.
- .5 Packaging Waste Management: remove for reuse pallets, crates, and packaging materials as specified in Waste Reduction Work plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 CORROSION INHIBITOR

- .1 Corrosion inhibitor requirements:
 - .1 Suitable for application on hardened concrete of bridge deck and sidewalk.
 - .2 Penetrates surface of concrete and protects steel reinforcing bars against corrosion due to chloride penetration, extending service life of structure.
 - .3 Compatible with waterproofing membrane to be applied to bridge deck and with crack injection product used on deck.
 - .4 Preparation, application, and curing times compatible with requirements of project schedule.
 - .5 Non-toxic.
 - .6 Durable.
 - .7 Does not decrease life-span of concrete.
 - .8 Suitable for application to concrete already containing elevated chloride levels.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify site conditions are acceptable for application of corrosion inhibitor in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 APPLICATION

- .1 Cleaning:
 - .1 Clean entire surface of concrete of deck between barriers by means of jet of steel shot applied by machine on wheels. Adjust equipment to have maximum intensity jet. Deck surface must be dry at the time of cleaning. Cleaning of surface must not create a step in surface between two consecutive passes of equipment.
 - .2 Clean sidewalk and surfaces situated along and on the bottom 65 mm of barriers, and deck joints with damp abrasive jet or high-pressure water in fashion so as to remove all laitance, all trace of rust on metal parts, all encrusted debris, all

bituminous residue, etc. Surface so cleaned must then be washed of all debris with a pressurised water jet (pressure 15 MPa, flow 20 l/min, jet nozzle concentrated circular and nozzle-surface distance of 150 mm to 200 mm).

- .2 Do not apply when frost or rain is expected, or when substrate temperatures are expected to exceed manufacturer's limitations.
- .3 Apply corrosion inhibitor to surface of deck and sidewalk in accordance with manufacturer's instructions. Number of coats as recommended by the manufacturer for exterior horizontal surfaces.
- .4 Protect corrosion inhibitor from contact during curing.
- .5 Protect corrosion inhibitor from adverse weather in accordance with manufacturer's written instructions.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

- .1 Protect finished installation until corrosion inhibitor has penetrated into deck.

END OF SECTION