

PART 1      GENERAL

1.1            Measurement for Payment

- .1            No separate payment shall be made for concrete reinforcing. Supply of all labour, materials and equipment to complete the reinforcing steel required for the work, as indicated on the drawings or specified herein shall be considered incidental to cast in place concrete work and shall be paid for under bid item 22 – Cast in place concrete.

1.2            Quality Assurance

- .1            At least one person thoroughly familiar with the type of material being installed, the referenced standards and the requirements of this section shall direct this portion of the Work.
- .2            Install steel reinforcement in accordance with CSA-A23.1 and CSA-W186.
- .3            Upon request, provide the Departmental Representative with a certified copy of mill test report of the proposed reinforcing steel, showing physical and chemical analysis, a minimum of 2 weeks prior to ordering of reinforcing steel, or as necessary to facilitate a review.
- .4            Upon request, inform the Departmental Representative of proposed source of material to be supplied.

1.3            Submittals

- .1            Submit shop drawings, including placing of reinforcement.
- .2            Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacing, location of reinforcement and any mechanical splices (only if approved by the Departmental Representative), with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacing and locations of chairs, spacers and hangers.
- .3            Prepare reinforcement drawings in accordance with the Reinforcing Steel Manual of Standard Practice - by the Reinforcing Steel Institute of Canada, or ACI 315 and ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
- .4            Detail lap lengths and bar development lengths to CSA-A23.3.
- .5            Locate laps in co-ordination with the location of construction joints.
- .6            If in the opinion of the Departmental Representative, the drawings are inadequate or inaccurately prepared, revise and resubmit all shop drawings.

PART 2      PRODUCTS

2.1            Materials

- .1            Reinforcing Steel: billet steel, Grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise. Weldable low alloy steel deformed bars to CAN/CSA-G30.18.

- .2 Tie Bars: to CSA-G30.18 grade 300, billet-steel, deformed bars, uncoated; and also to ASTM D3963 for epoxy-coated.
- .3 Steel Dowels: to CSA-G30.18, clean, straight, free from flattened or burred ends, uncoated and also to ASTM D3963 for epoxy-coated.
- .4 Cold-Drawn Steel Wire: to CSA-G30.3M, uncoated; to ASTM D3963 for epoxy coated.
- .5 Welded Steel Wire Fabric: to CSA-G30.5M, uncoated; to ASTM D3963 for epoxy coated.
- .6 Chairs, bolsters, bar supports, spacers: adequate for strength and support of reinforcing and live loads during construction conditions.
- .7 Tie Wire: Cold-drawn annealed steel to CSA-G30.3.
- .8 Epoxy Coating: to ASTM A775/A775M.
- .9 Galvanizing: to CAN/CSA-G164.
- .10 Plain Round Bars: to CSA-G40.21.
- .11 All other materials, not specifically described but required for a complete and proper installation of concrete reinforcement, shall be as selected by the Contractor and be subject to the approval of the Departmental Representative.
- .12 Supplementary cementing materials and their use to CAN/CSA-A3000.

## 2.2

### Fabrication

- .1 Fabricate reinforcing steel in accordance with CSA-A23.1, ACI 315, unless otherwise stated.
- .2 Obtain Departmental Representative's approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA-W186.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.
- .5 Protect epoxy and paint coated portions of bars with covering during transportation and handling.

## PART 3

### EXECUTION

## 3.1

### Field Bending

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

- .3 Replace bars that develop cracks or splits.

### 3.2 Placing Reinforcement

- .1 Place reinforcing steel as indicated on approved drawings and in accordance with CSA-A23.1.
- .2 Place sufficient chairs, and supports to adequately maintain the position of the reinforcing steel during placement of concrete, to within tolerances specified in the referenced CSA/CAN guidelines. Use tie wire to prevent the moving or dislodging of reinforcing steel during placement of the concrete.
- .3 Use plain round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease.
- .4 Prior to placing concrete, obtain the Departmental Representative's approval of reinforcing material placement.
- .5 Ensure cover to reinforcement is maintained during concrete pour.
- .6 Reinforcing steel, anchor bolts, or other required inserts shall not be inserted into concrete during placement.

### 3.3 Field Touch-up

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

END OF SECTION

PART 1      GENERAL

1.1          Measurement for Payment

- .1          Cast in place concrete will be paid per cubic metre as measured by the Department Representative and paid under bid item 22 – Cast In Place Concrete.
- .2          Payment for cast in place concrete shall include all forms and reinforcing steel and shall be done to City of Edmonton standards using class C concrete as outlined in the City of Edmonton construction specifications sections 02770 – Concrete Curb/Gutter/Walk/Slabs, 03060 – Concrete for Roadways, 03100 – Concrete Forms and Accessories, 03055 – Portland Cement Concrete, 03210 – Reinforcing Steel, and 02318 – Trench and Backfill.

1.2          Quality Assurance

- .1          Upon request from Departmental Representative, submit manufacturer's test data and certification that materials used in the cast in place concrete mix meet requirements of this Section.
- .2          Testing of materials and compaction testing will be carried out by an independent testing company and paid for by the Contractor.

PART 2      PRODUCTS

2.1          Materials

- .1          Portland cement: to City of Edmonton Construction Specification Section 03055 – Portland Cement Concrete.
- .2          Water: to City of Edmonton Construction Specification Section 03055 – Portland Cement Concrete.
- .3          Aggregates: to City of Edmonton Construction Specification Section 03055 – Portland Cement Concrete.
- .4          Chemical admixtures: to [ASTM C 494/C 494M]. Use of accelerating or set retarding admixtures for cold and hot weather placing to approval of Departmental Representative.

2.2          Concrete Mix and Site Preparation

- .1          Concrete mix and site preparation to be in accordance with the City of Edmonton construction specification section 03060 – Concrete for Roadways.
- .2          Class C concrete mix shall be used for all cast in place concrete structures on site as defined in the City of Edmonton construction specification section 03060 – Concrete for Roadways.
- .3          Portland Cement shall conform to City of Edmonton construction specification section 03055 – Portland Cement Concrete

PART 3      EXECUTION

3.1      Examination

- .1      Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for precast concrete installation 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 and after receipt of written approval to proceed from Departmental Representative.

3.2      Placing

- .1      Place concrete to City of Edmonton Construction Specification Section 03055 Portland Cement Concrete.

3.3      Finishing

- .1      Finish concrete to City of Edmonton Construction Specification Section 03055 Portland Cement Concrete, and as supplemented below:
- .2      Brush or Broom Finish: Use a brush or a broom with nylon bristles that can form surface grooves no deeper than 3 mm. Remove excess water from the bristles before brushing. Brush in the designated direction.
- .3      Burlap Finish: Drag multiple ply burlap equal in length to the width of the slab and having at least a 1 m strip in contact with the plastic concrete surface. Drag carefully in the direction of concrete placement to produce a finished surface simulating a sandy texture with no disfiguring marks.

3.4      Joints

- .1      Construct joints as required in each type of construction to the following standards as applicable.
- .2      Crack-Control Joints: intended to control the location of shrinkage cracks in hardening concrete. Construct joints to the indicated dimensions, spacing, and pattern by any of the following methods:
  - .1      Formed Joint: Form the groove by inserting a metal or fibre strip, or polyethylene film into the plastic concrete. Finish the edges to a 6 mm radius. Remove the insert immediately after the initial set of the concrete. Seal the joint with a specified sealant.
  - .2      Tooled Joint: Hand form the groove using a jointing tool with a thin metal blade to impress a plane of weakness into the plastic concrete. Finish the edges to a 6 mm radius. Seal the joint with a specified sealant.
  - .3      Sawed Joint: Cut the groove with a concrete saw as soon as the concrete

surface has hardened sufficiently to resist raveling as the cut is made, but before shrinkage cracks form in the concrete. The Contractor is responsible for the proper timing of the saw cut. Immediately flush the saw cut clean with water. Once the joint surfaces are dry, seal the joint with a specified sealant.

- .3 Isolation Joint: required where concrete is placed adjacent to an immovable structure or where indicated on the Drawings. Construct the joint by sawing or forming to create a clean break through the full cross-section of the concrete member. Make the joint wide enough to permit a snug fit for the pre-formed joint filler. Alternatively, place the pre-formed joint filler against the structure and pour the concrete against the pre-formed joint filler.
- .4 Construction Joint: required between concrete pours or for joining new concrete to existing work. Construct the joint with a keyway, dowels or tie bars as detailed on the drawings or as directed by the Engineer. Finish edges to a 6 mm radius. Vertically trim the existing concrete by sawing at least 50 mm deep and breaking. Leave the joint form in place until the concrete has set, then remove the joint form without damaging the concrete.

### 3.5 Protection and Curing

- .1 Protect freshly placed concrete from freezing, premature drying, temperature extremes, adverse weather conditions, and physical disturbance to clause 7.4, CAN/CSA-A23.1, and as supplemented below.
- .2 Cold Weather Protection: Concrete shall be protected from freezing for a minimum of 4 days after placement or for the time necessary to achieve 75% of the specified 28-day compressive strength.
- .3 Membrane Curing: Cure exposed concrete surfaces using a specified curing compound applied with a pressurized spray nozzle. Curing compound shall be applied immediately after final finishing and cover the entire exposed surface with an unbroken and uniform film at a rate depending on surface roughness but not less than 1 litre per 4 m<sup>2</sup> of surface. Membrane curing will not be required when the maximum daily air temperature for the 72 hours following placement of the concrete is not expected to be greater than 5° C.
- .4 Moist Curing: Use where specified or directed by the Departmental Representative. After the concrete has set, maintain exposed surfaces continuously moist using wet burlap or polyethylene film in contact with the concrete for a minimum of 7 consecutive days after placement when Type GU or Type HS cement is used, or a minimum of 3 consecutive days when Type HE cement is used.

END OF SECTION

PART 1      GENERAL

1.1          Measurement for Payment

- .1          Precast concrete steps and all associated work will be paid for as a lump sum payment under bid item 10 – Precast Concrete Steps.
- .2          Work associated with precast concrete steps include:
  - Shipping of handrail to the job site.
  - Installation of steps to the satisfaction of the Departmental representative including mounting, levelling, and securing the stairs by use of backfill.

1.2          Quality Assurance

- .1          Upon request from Departmental Representative, submit manufacturer's test data and certification that materials used in the precast concrete mix meet requirements of this Section.

PART 2      PRODUCTS

2.1          Materials

- .1          Portland cement: to CSA A3000, Type 10.
- .2          Water: to CSA A23.1/A23.2.
- .3          Aggregates: to CSA A23.1/A23.2.
  - .1          Coarse aggregates to be normal density.
- .4          Chemical admixtures: to [ASTM C 494/C 494M]. Use of accelerating or set retarding admixtures for cold and hot weather placing to approval of Departmental Representative.

2.2          Concrete Mix and Site Preparation

- .1          Concrete mix and site preparation to be in accordance with the City of Edmonton construction specification section 02770 – Concrete Curb/Gutter/Walk/Slabs.

PART 3      EXECUTION

3.1          Examination

- .1          Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for precast concrete installation 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 and after receipt of written approval to proceed from Departmental Representative.

3.2            Installation

- .1            Install precast concrete steps and parking lot stop blocks as per manufacturer's instructions.
- .2            Level concrete steps and secure in position as per manufacturer's recommendation. Secure parking lot stop blocks as per manufacturer's recommendation.
- .3            Replace damaged and defective units as directed by Departmental Representative.

END OF SECTION



PART 1      GENERAL

1.1      Summary

- .1      Provide non shrink, rapid setting, high strength repair mortar for horizontal structural patch and repair of existing concrete substrate.
- .2      Provide high strength, non-metallic, Portland cement based non shrink grout.
- .3      Related Sections: Other specification sections which relate directly to the work of this section include the following:  
  
            Section 033000: Cast-In-Place Concrete  
            Section 034000: Precast Concrete

1.2      Submittals

- .1      Product Data: Submit for Department Representatives approval all manufacturer's product data prior to installation for each material and product used including manufacturer's Material Safety Data Sheets.

1.3      References

- .1      ASTM C 109: Compressive Strength of Hydraulic Mortars
- .2      ASTM C 191: Setting time of Hydraulic Cement
- .3      ASTM C 882: Slant Shear Bond Strength
- .4      ASTM C 928: Rapid Hardening Cementitious Materials for Concrete Repairs
- .5      ASTM C 939: Flow of Grout
- .6      ASTM C 1107: Hydraulic Cement Grout (Non Shrink)

1.4      Quality Assurance

- .1      Installer's Qualifications: The contractor shall be qualified to perform the work specified by reason of experience.

1.5      Delivery, Storage, and Handling

- .1      Deliver products in original packaging, labeled with product identification, manufacturer, batch number and shelf life.
- .2      Store products in a dry area. Protect from direct sunlight.
- .3      Handle products in accordance with manufacturer's printed recommendations.

1.6      Measurement For Payment

No separate payment shall be made for Non shrink grout. Non shrink grout shall be considered incidental to Steel Hand Rail installation and shall be incorporated into the price for bid item 9 – Steel Hand Rail – Galvanized.

PART 2      PRODUCTS

2.1          Materials

1.          Description: Non-shrink, non-stain, non-metallic grout.
2.          Compliance:
  - .1          CRD C-621.
  - .2          ASTM C 1107, Grade B.
3.          Compressive Strength, ASTM C 109:
  - .1          3 Days: 20.7MPa
  - .2          28 Days: 37.9MPa
4.          Volume Change, ASTM C 1090:
  - .1          1 Day: +0.3 % maximum.
  - .2          28 Days: +0.3% maximum

PART 3      EXECUTION

3.1          Examination

- .1          Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.
- .2          Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas landscaping from contact due to mixing and handling of materials.

3.2          Surface Preparation

Comply with manufacturer's printed instructions and the following:

- .1          Remove all spalled and unsound concrete from area to be repaired. If rusty reinforcing steel is present; it must be abrasive blasted to remove rust.
- .2          Remove enough material to completely expose reinforcing steel.
- .3          Large vertical or overhead patches deeper than 50 mm should contain reinforcing steel. An additional steel should be inserted using appropriate techniques, if none is present.
- .4          Clean surface to be repaired of all materials including dust, oil, dirt and grease.
- .5          Dampen with clean water before patching and remove standing water.

3.3          Application

Comply with manufacturer's printed instructions and the following:

- .1          Instructions for use as a Grout
  - .1          The area to be grouted should be thoroughly flushed and soaked with clean water prior to grouting. Leave no standing water.

- .2 Place the grout quickly and continuously use light rodding or strapping is permitted to eliminate air bubbles.
- .3 Grout temperature should be maintained from 10°C - 32°C to achieve specified results. Use cold water in hot weather or hot water in cold weather to achieve desired grout temperature. Do not use if temperature is expected to go below 0°C within a 12 hour period.

3.4 Curing

- .1 Grouting applications must be damp cured for at least one day.

3.5 Cleaning

- .1 Remove excess material before material cures. If material has cured, remove using mechanical methods that will not damage substrate.

END OF SECTION