

## PART 1 - GENERAL

### 1.1 References

- .1 AASHTO M314-90-UL Standard Specification for Steel Anchor Bolts.
- .2 ASME B30.26-2010 Rigging Hardware.
- .3 ASTM C1107-2011 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- .4 ASTM F1554-07a1 Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- .5 CAN/CSA A23.2-09 Test methods and standard practices for concrete.

### 1.2 Submittals

- .1 Product data.
- .2 Anchor installation procedure, which must include procedures for:
  - .1 Measurements.
  - .2 Hole drilling.
  - .3 Hole cleaning and preparation.
  - .4 Anchor installation.
  - .5 Grout mixing and placement.
  - .6 Grout curing.
  - .7 Proof loading.
- .3 Results all tests.

### 1.3 Delivery, Storage, and Handling

- .1 Store anchors and grout in accordance with manufacturers' recommendations.

### 1.4 Locations

- .1 Two new deck anchors are required, one each at the following locations:
  - .1 Near downstream crane rail at Pier #6, where one existing anchor is damaged; and,
  - .2 Near downstream crane rail at Pier #7, where one existing anchor is damaged.

## PART 2 - PRODUCTS

### 2.1 Materials

- .1 Anchors rods:- to ASTM F1554 Grade 36 or to AASHTO M314 Grade 36. Threads: 1-8UNC Class 2A. Either all-threaded or threaded on each end are both acceptable.

- .2 Eye nuts:- Forged eye nuts, quenched and tempered, to ASME B30.26, fatigue-rated, internally threaded 1-8UNC Class 2B, hot dip galvanized after threading.
- .3 Hex nuts:- plain, finished, hex nuts to ASTM A563 Grade A or to AASHTO M291 Grade A, threaded 1-8UNC Class 2B.
- .4 Washers:- plain, flat, with inside diameter 25.4mm and outside diameter of 63.5mm, to ASTM F436 or to AASHTO M293.
- .5 Grout - Shrinkage-compensating grout, pre-packaged, pre-blended, non-metallic, non-corrosive, non-gaseous, cementitious, to ASTM C1107 Grade C. Minimum compressive strength at 28 days: 50 MPa.

### PART 3 - EXECUTION

#### 3.1 Removals

- .1 Cut heads off damaged anchors flush to concrete.

#### 3.2 Drilling for New Anchor Installation

- .1 Core-drill out old anchor to create hole for new anchor. Clean out cored hole with high pressure air or water jet.
- .2 Fill cored hole with water and let stand 24 hours before starting grouting operations. Remove water and probe hole to ensure absence of obstructions before installing new anchor.
- .3 Mix grout to manufacturer's instructions. Fill hole slowly until hole is full. Rod hole to remove all air pockets from grout.
- .4 Install nut-washer-nut combination at end of thread bar to create a headed anchor.
- .5 Install anchor in grouted hole, supporting it at correct position and elevation (as shown on drawings) within grout pocket until liquid grout hardens. Wipe up all grout that spills out.
- .6 Cure to grout manufacturer's instructions, taking care that anchors cannot become mis-aligned during this process.
- .7 No sooner than 7 days and no later than 14 days after grout placement, proof-test all anchors.

#### 3.3 Grout Testing

- .1 Test compressive strength of grout using 50mm cube specimens to CAN/CSA-A23.2-09. Obtain samples for this testing directly from grout tube.

#### 3.4 Proof Test

- .1 Proof-test each anchor by independent testing company to proof

load of 23kN.

### 3.5 Repair of Defective Work

- .1 Core out and remove anchors which fail proof testing or which are mis-located. Install new anchors and proof-test as described in this Section at no additional cost.

END OF SECTION

## PART 1 - GENERAL

### 1.1 References

- .1 CSA International
  - .1 CAN/CSA-G40.20/G40.21-[98], General Requirements for Rolled or Welded Structural Quality Steel.
  - .2 CAN/CSA Z259.2.2-98 Self-Retracting Devices for Personal Fall Arrest Systems.
  - .3 CAN/CSA Z259.10-12 Full Body Harness.
  - .4 CAN/CSA Z259.16-04 (R2009) - Design of Active Fall-Protection Systems.
  - .5 CAN/CSA-Z259.15-12 Anchorage Connectors.
- .2 Canada Occupational Health and Safety Regulations (SOR/86-304)
  - .1 Fall Protection Systems Section 12.10
- .3 ASTM International
  - .1 ASTM A307-12 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.

### 1.2 Submittals

- .1 Product data:- manufacturers' printed product literature, specifications, test reports, product compliance certificates, and data sheets.
- .2 Shop drawings:- Show layout, profiles, and anchorage details. For fall protection system: Include structural analysis data. Shop drawings & calculations for fall protection system to be stamped by a Professional Engineer licensed to practice in Ontario.
- .3 As-built drawings.
- .4 Letter of certification for the fall protection anchorages.

## PART 2 - PRODUCTS

### 2.1 Beam Support Brackets

- .1 Five cast iron cross-beams are located in the undercarriage of the stoplog lifting machine. These cross-beams contain the bearings for the long drive shaft of the machine. Support both ends of all five cross-beams with a total of ten (10) new support brackets.
- .2 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W.
- .3 Bolts: to ASTM A307 Grade A.
- .4 Coatings: One coat primer and one topcoat of any type suitable for outdoor use. Colour: any. Apply coatings in shop after cutting and drilling is complete. Follow paint manufacturer's instructions for surface preparation and application.

## 2.2 Fall Protection System

- .1 Anchorages:- Provide two (2) personnel fall-arrest anchorages on downstream side of stoplog lifting machine. Attach anchorages to vertical channels which support the cantilevered beams of the stoplog lifting machine. Make minimal openings through the wooden housing at these locations to allow for installation of anchorages. Install approximately 1900 mm up from the dam deck. Attach the anchorages with bolts (welding to the stoplog lifting machine is not permitted).
  - .1 Anchorage connectors: to CAN/CSA-Z259.15-12.
  - .2 Design criteria: loads to Clause 12.10 Fall Protection Systems of Canada Occupational Health & Safety Regulations (made under Canada Labour Code) and calculation methods to CAN/CSA Z259.16-04.
- .2 Self-retracting fall limiters:- to CSA Z259.2.2-98 Self-Retracting Devices for Personal Fall Arrest Systems, Type 1. Quantity: 3. Harness connection: Locking snap hook with swivel. Anchorage connection: twist-lock carabiner with swivel.
- .3 Full-body harnesses:- to CSA Z259.10-12 Full Body Harness. Quantity: 3. Provide catalogue information to show size range and Departmental Representative will liaise with damkeepers to select appropriate sizes.

## 2.3 Deck Anchors

- .1 To Section 05 05 19 - Post-Installed Concrete Anchors.

## PART 3 - EXECUTION

### 3.1 Beam Support Brackets

- .1 Fabricate and install work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Install brackets on stoplog lifting machine with bolts (welding to the stoplog lifting machine is not permitted).

### 3.2 Fall Protection System

- .1 Fabricate fall protection system anchorages to approved shop drawings.
- .2 Create openings in wood housing of stoplog lifter and install anchorages to approved shop drawings. Minimize disturbance to wood housing to accomplish this. Make all connections to vertical channels with bolts (welding is not permitted).
- .3 Deliver other items to site in original packaging.

### 3.3 Deck Anchors

.1 To Section 05 05 19 - Post-Installed Concrete Anchors.

END OF SECTION