

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 23 15 – Rock Scaling
- .2 Section 31 23 16.26 – Rock Disposal

1.2 REFERENCES

- .1 ASTM International, ASTM F432-13 Standard Specification for the Roof and Rock Bolts and Accessories.

1.3 DEFINITIONS

- .1 Rock Bolting: the term rock bolting shall mean the installation of friction stabilizers in accordance with manufacturer's directions and approved standard practices. Hole depth shall be nominally 3.0m or as directed by the Departmental Representative to suit particular field conditions. The Contractor shall assume all responsibility for site preparation and rock face stability including disposal of rock and other materials, in order to provide safe working conditions and for rock cliff remediation. The work of this section includes all labour, materials, and equipment to provide access and to carry out the rock bolting as required.

1.4 UNIT PRICES

- .1 The unit of measurement shall be on an installed basis per unit rock bolt inclusive of all labour, equipment and products.
- .2 The crew for rock bolting shall include, as a minimum, two persons, all necessary equipment operators, the Contractor's foreman and any other persons required to safely and efficiently carry out the necessary work.
- .3 Payment for the work of this Section will be made in accordance with the unit prices contained in the Schedule of Quantities and Prices. All costs associated with the management and disposal of materials are deemed to be included in the contract unit price.
- .4 No separate payment will be made for routine inspection by the Contractor or for the supply, installation or movement of anchor points, equipment or staging to access the work and no payment will be made for delays caused by mechanical breakdown or other delays caused by the Contractor. Payment will only be made for time spent actively rock bolting at the cliff face.
- .5 No separate payment will be made for rock bolting outside the site limits shown on the drawings unless required for safety reasons and approved in advance by the Departmental Representative.

1.5 EQUIPMENT

- .1 Supply all necessary equipment to access the Works.
- .2 All equipment for accessing the rock cliffs shall be in safe and good working condition to the satisfaction of the Departmental Representative.
- .3 All mobile equipment shall be equipped with an audible back up warning device. All operators shall be equipped with two way radios.

1.6 ANCHOR POINTS

- .1 Establish appropriate anchor points for fall arrest or rope access in accordance with Ontario Occupational Health & Safety Act and Regulations requirements. The Contractor should note that the existing stone parapet wall and railing along the crest of the cliff are not suitable for anchor points for fall arrest or for rope access work and shall not be used in any way.
- .2 If required, submit design drawings for engineered anchor points approved by an engineer licensed in the province of Ontario.

Part 2 Products

2.1 ROCK BOLTS

- .1 The rock face shall be secured, as directed by the Departmental Representative in the designated areas with suitable galvanized, 39 mm diameter, 3.0 m long friction stabilizers (rock bolts) made in accordance with ASTM F 432. Provisions for longer rock bolts may be determined pending field conditions and subsequent site directions. Rock bolts to have code stampings indicating the size, date and place of manufacture and heat lot of steel. Rock bolts shall be capable of providing a load capacity of 9.1 tonnes.
- .2 Rock bolts shall be installed in accordance with manufacture's recommendations using the proper equipment and drill-hole size as specified for the selected rock bolt.
- .3 Domed Galvanized Bearing Plates to be used in conjunction with rock bolts and are to be meet ASTM F 432 standards (where applicable) and shall be capable of providing a load capacity of 9.1 tonnes with minimal deflection.

Part 3 Execution

3.1 ROCK BOLTING

- .1 All personnel engaged in rock bolting work shall be completely conversant with working at heights and be fully qualified to perform the work.
- .2 Carry out all rock bolting in a safe working manner and to the satisfaction of the Departmental Representative.
- .3 All rock fall protection required to preserve existing structures, facilities and walkways shall be in place and fully functional prior to undertaking any rock bolting work on the cliff above.
- .4 All rock bolting operations shall comply with the Ontario Ministry of Labour requirements and the Ontario Occupational Health & Safety Act and Regulations and any other applicable codes, regulations or standards.
- .5 Identify and plan in advance each day the location of rock bolting with the Departmental Representative.
- .6 Undertake rock bolting from the top of the rock face down to ensure that at no time the scaling crew is working beneath loosened or undercut sections of the rock face.
- .7 Ensure the rock bolting crew is in full-time radio contact with the foreman to permit direct and immediate control.

- .8 Inspect the rock face with the crew at the start of each working day to identify rock that requires immediate removal so as not to endanger the workers.
- .9 Inspect the rock face to ensure that all loose rock that may endanger the work areas below has been removed prior to shut down.
- .10 Manage all material resulting from the operation and dispose of off-site.
- .11 Rock bolting may be required in areas other than those identified in Drawing C2 and shall be based on Departmental Representative recommendations.

3.2 QUALITY CONTROL

- .1 All work shall be done by a contractor experienced with this type of rock bolt.
- .2 Before start of installation, supply the Departmental Representative for review and approval with data sheets of rock bolts to be used.
- .3 Quality Control procedures and implementation are the responsibilities of the General Contractor, and submission of a quality control plan for work executed under this section may be requested.
- .4 The Plan shall include:
 - .1 The names of personnel responsible for execution of the plan and for the proof testing of the rock bolts.
 - .2 Means and methods for confirming material compliance with specifications, and associated documentation procedures.
 - .3 Program for confirming and documenting compliance of sub-trade qualifications and their individual employees, sub-contractors and engineers.
 - .4 Procedures for reviewing compliance in the field with construction documents including documentation of locations reviewed, photographs taken and timing for review. The contractor's review must be completed prior to review of the Departmental Representative.
 - .5 Procedures for rectifying deficiencies noted by the contractor or Departmental Representative.
- .5 Conduct pull test on 10% of installed rock bolts to a yield stress of 9.1 tonnes.
- .6 Conduct pull test in accordance with manufacturer's instructions and in the presence of Departmental Representative.
- .7 Provide proof testing results stamped by an engineer licensed in the Province of Ontario and retained by the Contractor to Departmental Representative
- .8 If a test anchor fails the proof test, the Contractor shall undertake, at his own expense, all additional work necessary to allow anchor already installed to carry safely the specified loads.
- .9 Proposed modifications to installed anchor are subject to the approval of the Departmental Representative.

END OF SECTION