

# Yoho National Park

## Rock Slope Reprofiling

### List of Specifications

Specification	Title	Number of Pages
00 73 19	Health and Safety Requirements	5
01 11 00	Summary of Work	3
01 14 00	Work Restrictions	4
01 25 00	Mobilization & Demobilization	2
01 31 00	Project Management and Coordination	4
01 33 00	Submittal Procedures	4
01 42 16	General Definitions	1
01 52 00	Construction Facilities	4
01 55 26	Traffic Management	6
01 57 19	Environmental Procedures	9
01 74 23	Cleaning	2
01 77 00	Closeout Procedures	2
01 78 00	Closeout Submittals	2
31 11 00	Clearing and Grubbing	4
31 22 13	Rough Grading	2
31 23 00	Stock Pile Storage	3
31 23 20	Rock Scaling	3
31 23 21	Rock Blasting	9
31 23 22	Common Excavation	3
31 72 13	Anchoring	5
32 91 19	Topsoil Placement and Grading	2
32 92 19	Seeding	1

## **SECTION 00 73 19 HEALTH AND SAFETY REQUIREMENTS**

### **PART 1 GENERAL**

#### **1.1 SCOPE AND INTENT**

- .1 This section provides Health and Safety considerations required to ensure that Parks Canada shows due diligence towards health and safety on construction sites, and meets the requirements laid out in PCA/RPB Departmental Policy DP 073 - Occupational Health and Safety - Construction.
- .2 The Contractor shall take all necessary precautions and measures to prevent injury or damage to persons and property on or near the Work Site.

#### **1.2 PRECEDENCE**

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

#### **1.3 RELATED SECTIONS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 57 19 - Environmental Procedures

#### **1.4 REFERENCES**

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
- .3 Province of British Columbia
  - .1 Workers Compensation Act.
  - .2 Occupational Health and Safety Regulations.

#### **1.5 SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 The Contractor shall submit a site-specific Health and Safety Plan a minimum of twenty (20) days prior to mobilization to site. Health and Safety Plan must include:
  - a. Contractor's health and safety policy.
  - b. Identification of applicable compliance obligations.
  - c. Definition of responsibilities for project safety/organization chart for project.
  - d. General safety rules for project.
  - e. Job specific safe work procedures.

- f. Inspection policy and procedures.
  - g. Incident reporting and investigation policy and procedures.
  - h. On-Site Contingency and Emergency Response Plans to address standard operating procedures to be implemented during emergency situations.
  - i. Occupational Health and Safety meetings.
  - j. Occupational Health and Safety communications and record keeping procedures.
  - k. Results of site specific safety hazard assessment.
  - l. Results of safety and health risk or hazard analysis for site tasks and operation.
- .3 The Departmental Representative will review the Contractor's site-specific Health and Safety Plan and provide comments to the Contractor within seven (7) days after receipt of plan. The Contractor shall revise the plan as appropriate and resubmit it to the Departmental Representative within five (5) days after receipt of comments.
- .4 The Departmental Representative's review of the Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .5 The Contractor shall submit an electronic version or two (2) paper copies of a weekly Work Site Health and Safety Inspection Report prepared by the Contractor's authorized Safety Representative to the Departmental Representative on a weekly basis.
- .6 The Contractor shall submit copies of reports or directions issued by Federal and Provincial health and safety inspectors to the Departmental Representative.
- .7 The Contractor shall submit copies of incident and accident reports to the Departmental Representative.
- .8 The Contractor shall submit copies of Material Safety Data Sheets (MSDS) to the Departmental Representative.

## **1.6 FILING OF NOTICE**

- .1 The Contractor shall file Notice of Project with Provincial authorities prior to beginning Work.

## **1.7 SAFETY ASSESSMENT**

- .1 The Contractor shall perform site specific safety hazard assessment related to project.

## **1.8 MEETINGS**

- .1 The Contractor shall schedule and oversee a Health and Safety meeting with the Departmental Representative prior to commencement of Work.

## **1.9 REGULATORY REQUIREMENTS**

- .1 All work is to be undertaken in accordance with the National Parks Act.

**1.10 PROJECT/SITE CONDITIONS**

- .1 Work at site will involve contact with WorkSafeBC.

**1.11 GENERAL REQUIREMENTS**

- .1 Where deficiencies or concerns are noted, The Departmental Representative may alert the Contractor in writing, and may request correction of deficiencies or concerns in a timely manner.

**1.12 RESPONSIBILITY**

- .1 All site personnel are responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 The Contractor shall comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

**1.13 COMPLIANCE REQUIREMENTS**

- .1 The Contractor shall comply with all applicable safety regulations of WorkSafeBC including, but not limited to, the Worker's Compensation Act and the Occupational Health and Safety Regulations, Industrial First Aid Regulations, and Workplace Hazardous Materials Information System Regulations.
- .2 All Work shall comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

**1.14 UNFORESEEN HAZARDS**

- .1 When unforeseen or peculiar safety-related factors, hazards, or conditions occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of the Province having jurisdiction, and advise the Departmental Representative verbally and in writing.

**1.15 HEALTH AND SAFETY REPRESENTATIVE**

- .1 The Contractor shall employ and assign to the Work, a competent and authorized Health and Safety Representative. The Health and Safety Representative must:
  - a. Have minimum 2 years' site-related working experience specific to activities associated with rock excavation and large earthworks projects.
  - b. Have working knowledge of occupational safety and health regulations.
  - c. Be responsible for completing the Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
  - d. Be responsible for implementing, enforcing, and monitoring the Contractor's site specific Health and Safety Plan.

- e. Be on site during execution of Work and report directly to and be under direction of Site Supervisor.

#### **1.16 POSTING OF DOCUMENTS**

- .1 The Contractor shall ensure applicable items, articles, notices and orders are posted in a conspicuous location on site in accordance with Acts and Regulations of the Province having jurisdiction, and in consultation with the Departmental Representative.

#### **1.17 CORRECTION OF NON-COMPLIANCE**

- .1 The Contractor shall immediately address health and safety non-compliance issues identified by the authority having jurisdiction or by the Departmental Representative.
- .2 The Contractor shall provide the Departmental Representative with a written report of action taken to correct non-compliance of health and safety issues identified.
- .3 The Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.
- .4 In the event that work is temporarily stopped either by the Departmental Represented, or by the authority having jurisdiction, it will not relieve the Contractor of his responsibilities under this Contract. Standby time and all costs associated with a stop work order due to safety considerations is considered incidental to the contract.

#### **1.18 BLASTING**

- .1 Blasting or other use of explosives is not permitted until approval has been provided by the Departmental Representative.
- .2 Blasting is to be in accordance with Section 01 57 19 - Environmental Procedures and Section 31 23 21 – Rock Blasting.

#### **1.19 POWDER ACTUATED DEVICES**

- .1 The use powder actuated devices is only permitted after receipt of written permission from the Departmental Representative.

#### **1.20 WORK STOPPAGE**

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

### **PART 2 PRODUCTS**

#### **2.1 NOT USED**

- .1 Not used.

### **PART 3 EXECUTION**

#### **3.1 NOT USED**

- .1 Not used.

**PART 4      MEASUREMENT**

- 4.1**      All health and safety requirements are considered incidental to the Contract and shall not be measured for payment.

**END OF SECTION**

## SECTION 01 11 00 SUMMARY OF WORK

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- .1 Title and description of Work.
- .2 Contract Method.
- .3 Work by others.
- .4 Work sequence.
- .5 Contractor use of premises.
- .6 Owner occupancy.

#### 1.2 DEFINITIONS

- .1 Not Used

#### 1.3 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.

#### 1.4 PROJECT LOCATION

- .1 The project is located in Yoho National Park, British Columbia. Construction work is on the Trans-Canada Highway between km 88 to km 91 and km 114 to km 128. The following are key locations relative to the project:

Sta. 0+000 – Banff East Park Gate

Sta. 88+500 – Sherbrooke Creek Rock Slope

Sta. 88+900 – Lower Sherbrooke Creek Rock Slope

Sta. 115+650 – Little Topple (future work)

Sta. 124+170 – Phyllite Slope

#### 1.5 WORK COVERED BY CONTRACT DOCUMENTS

- .1 The major Work Items of this Contract comprise production blasting, hauling, felled tree removal, and traffic management. Site offices for the Departmental Representative will be supplied and maintained by the Contractor. Other work items may include scaling, rock anchoring, trim blasting, installation of barriers, and site reinstatement.
- .2 Without limiting the scope of work, the work of this Contract generally comprises the following:
  - .1 Production blasting of the following slopes (cubic metres of excavation);
    - a. Sherbrooke – 55,380 m<sup>3</sup>
    - b. Lower Sherbrooke- 15,730 m<sup>3</sup>
    - c. Little Topple – 17,970 m<sup>3</sup> – Future work
    - d. Phyllite – 43,190 m<sup>3</sup>
  - .2 Production hauling to appropriate disposal sites as determined by the Departmental Representative.
    - a. AB/BC border site for bulk fill only.
    - b. Mount Vaux – all other materials.
  - .3 Supply and maintain site offices for the Department Representative on site.

- .4 Tree removal where appropriate.
- .5 Remediation of overburden and / or vegetation, where appropriate.
- .6 The work shall include the provision for landscaping.
- .7 Temporary traffic signage and traffic control.

## **1.6 CONTRACT METHOD**

- .1 Construct Work under the contract in a Unit Rate Contract.

## **1.7 WORK BY OTHERS**

- .1 The Contractor is advised that concurrent with the Yoho Slope Reprofilng project there may be other contractors working within the contract locations (ie. paving crews).
- .2 Where it is necessary that work is to proceed in areas of this project common to both the Contractor and others, the Contractor shall cooperate with the other Contractors and the Owner in reviewing their construction schedules, sharing his/her work space, and shall coordinate his/her operations with the other Contractors, including traffic management.
- .3 The Contractor who is awarded this Contract shall be the Prime Contractor for the TCH sections km 88 to 91 and km 114 to 128 for Site Safety and Traffic Management. Work done by other Contractors in this section will need to be coordinated between different contractors.

## **1.8 WORK SEQUENCE**

- .1 Complete all work by **October 31, 2015** (Contract Completion Date).
- .2 Schedule work progress to allow the Owner/Departmental Representative unrestricted access to inspect all phases of the Work.

## **1.9 CONTRACTOR USE OF PREMISES**

- .1 The Contractor has unrestricted use of site, subject to Section 01 14 00 – Work Restrictions, until the Contract Completion date.
- .2 The Contractor shall limit the use of the premises for Work, storage, and access to allow:
  - .1 Owner occupancy.
  - .2 Work by other Contractors.
  - .3 Maintain fire and emergency access on the Trans Canada Highway at all times.
- .3 Coordinate use of premises under direction of the Departmental Representative.
- .4 The Contractor and any Subcontractors shall obtain a business license from the Lake Louise Visitor Information Center prior to commencement of the contract.
- .5 All Contractor's business and private vehicles are required to display a vehicle work pass from Parks Canada. These permits may be obtained free of charge from PCA Environmental Surveillance Officer or as directed by the Departmental Representative.

## **1.10 OWNER OCCUPANCY**

- .1 Owner will occupy premises during entire construction period for execution of normal operations.
- .2 Cooperate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.



**PART 2        PRODUCTS**

**2.1        NOT USED**

.1        Not Used.

**PART 3        EXECUTION**

**3.1        NOT USED**

.1        Not Used.

**END OF SECTION**

## **SECTION 01 14 00 WORK RESTRICTIONS**

### **PART 1 GENERAL**

#### **1.1 SCOPE AND INTENT**

- .1 This section provides information on Work Restrictions related to the use of the site including conducting work near waterways, access to adjacent properties, existing utilities and infrastructure, protection of persons and property, use of public areas, supervisory personnel, meetings, mixing and storage of explosives, and waste disposal.

#### **1.2 PRECEDENCE**

- .1 For Federal Government projects, General Conditions take precedence over technical specification.

#### **1.3 RELATED SECTIONS**

- .1 Section 00 73 19 – Health and Safety Requirements.
- .2 Section 01 55 26 –Traffic Management.
- .3 Section 01 57 19 – Environmental Procedures.

#### **1.4 EXISTING SERVICES**

- .1 Provide for pedestrian, bicycle, vehicular, and wildlife traffic through the work areas for the duration of the construction.

#### **1.5 USE OF THE WORKSITE/LAYDOWN AREA**

- .1 The Work Site (limits shown on Drawings) will be taken to mean any location the Contractor is working, has personnel (either working or on standby), or has equipment (being used or stored), or any location noted in the drawings.
- .2 The Work Site and Laydown Area(s) will be allocated by PCA and shall only be used for purposes of the Work. Laydown Area(s) will be made available for the Contractor's non-exclusive use for the duration of the Work, unless otherwise provided in the Contract Documents.
- .3 The Contractor shall maintain adequate drainage at the Work Site without producing excessive sediment load in the existing watercourses.
- .4 PCA will provide an area for basic camping facilities for the site operatives.
- .5 While the Work Site and Laydown Area(s) are under the Contractor's control, the Contractor shall be entirely responsible for their security.
- .6 The Contractor shall keep the Work Site clean and free from accumulation of waste materials and rubbish regardless of source. Snow shall be removed by the Contractor as necessary for the performance and inspection of the Work at the cost of the Contractor.
- .7 Any damage to the Work Site or adjacent roadways or other existing facilities caused by the Contractor shall be repaired by the Contractor at their own expense.
- .8 The Contractor may undertake construction work during daylight hours with loading, hauling, and stockpiling of common excavation up to 24 hours per day, seven (7) days per week with the following restrictions:
  - a. No work during the period of an Alberta or British Columbia statutory holiday long weekend, including one day prior to and one day following the weekend (i.e., no work on Friday through Tuesday if the holiday falls on Monday).
  - b. No hauling of material during inclement weather.

- c. Traffic closures to facilitate the work shall be limited to 20 minutes and/or traffic lineups of no more than 1 km in accordance with Section 01 55 26 – Traffic Management.
- d. Extended Traffic Closures of up to 45 minutes duration (one per day for the project) will be permitted from Tuesday to Thursday to facilitate trimming and blasting operations that cannot be completed within a 20 minute closure. The schedule for Extended Closures must be submitted to the Departmental Representative for approval at least one (1) week in advance of the planned closure. These should occur between 08:00 to 09:30 (i.e., 45 mins closure finishes by 9:30)
- e. There may be restrictions to accommodate special events within Yoho National Park. PCA will provide two (2) weeks' notice of any upcoming restrictions.
- f. The Departmental Representative reserves the right to stop work in the case of excessive traffic delays during peak travel times.

#### **1.6 WORK CONDUCTED OVER OR ADJACENT TO WATERWAYS**

- .1 All components of the Work shall be conducted in accordance with Section 01 57 19 – Environmental Procedures and the Environmental Protection Plan for the project.
- .2 All components of the Work shall be conducted without equipment entering into wetlands, water bodies, streams, or rivers.
- .3 All waste materials from the Work shall be contained and collected in a manner to prevent any contact with the river valleys and waterways. Waste materials shall be disposed of in accordance with Section 01 57 19 – Environmental Procedures and the Environmental Protection Plan for the project.
- .4 The Contractor is responsible for the development and supply of construction access to the Work in accordance with Section 01 55 13 – Construction Access Roads.

#### **1.7 ACCESS TO ADJACENT PROPERTIES**

- .1 Construction operations shall be conducted so as to cause minimal inconvenience to the public and to owners of adjoining property. Existing access to property shall be maintained as far as possible, and if new access must be provided, every effort shall be taken to provide the new access before the existing access is removed.

#### **1.8 UTILITIES AND EXISTING INFRASTRUCTURE**

- .1 The Contractor shall regularly monitor the condition of the Work Site and of property on and adjoining the Work Site throughout the construction period, and shall immediately notify the Departmental Representative if any deterioration in condition is detected. Such monitoring shall cover all pertinent features and property including, but not limited to, buildings, structures, roads, walls, fences, slopes, sewers, culverts, and landscaped areas.
- .2 The Contractor shall be responsible for locating all utilities in the Work Area and for any damage incurred to utilities in the Work Area while occupying site.
- .3 The Contractor shall notify the Departmental Representative and utility companies at least seven (7) days in advance of any activities that may interfere with the operation of such utilities.
- .4 The Contractor shall assess the possible impact of its operations on all utilities that may be affected by its operations, and shall, in consultation with utility owner(s), protect, divert, temporarily support or relocate, or otherwise appropriately treat such utilities to ensure that they are preserved.

- .5 The Contractor shall immediately report any damage to utilities to the Departmental Representative and to the utility company or authority affected, and shall promptly undertake such remedial measures as necessary at no additional cost to the owner.
- .6 The Contractor shall be responsible for moving signs, concrete barriers, and other infrastructure where feasible to do so, and otherwise protecting all existing infrastructure such as pavement surface, curb, sidewalks, and culverts, in the work sites. The Contractor shall be responsible for repairing all damage that can reasonably be prevented. The costs of this work shall be considered incidental to contract and no separate payment will be made.

#### **1.9 PROTECTION OF PERSONS AND PROPERTY**

- .1 The Contractor shall take all necessary precautions and measures to prevent injury or damage to persons and property on or near the Work Site in accordance with all requirements outlined in Section 00 73 19 – Health and Safety Requirements.
- .2 The Contractor shall promptly repair, replace, or compensate a recognized stakeholder for any loss or damage caused by the Contractor to any property, or, if PCA so directs, shall promptly reimburse to PCA the costs resulting from such loss or damage.

#### **1.10 USE OF PUBLIC AREAS**

- .1 The Contractor shall ensure its vehicles and equipment do not cause nuisance in public areas. Vehicles and equipment leaving the Work Site and entering public roadways shall be cleaned of mud and dirt clinging to the vehicle body and wheels.
- .2 All vehicles transporting materials to or from the Work Site shall be loaded in a manner that prevents dropping of materials or debris on the roadways. Where contents may be blown off during transit such loads shall be covered by tarpaulins or other suitable covers. Spills of materials in public areas shall be removed or cleaned immediately by the Contractor at no cost to the Owner.
- .3 Hauling units running on the TransCanada Highway are not to exceed legal highway load limits. If the Contractor fails to follow these provisions, the Contractor shall pay the cost of any repairs required to the roadway or other infrastructure damaged by these operations.
- .4 All tracked equipment operating on paved roadways shall be equipped with “Street Pads” to prevent damage to the road surface.
- .5 Construction areas and construction crossing shall be flood-lit for any night operations.

#### **1.11 MEETINGS**

- .1 The Contractor shall attend the start-up meeting and progress meetings in accordance with Section 01 31 00 – Project Management.
- .2 The Contractor shall assemble all its site staff for an initial environmental briefing to be conducted by PCA’s Environmental Surveillance Officer in accordance with Section 01 57 19 – Environmental Procedures. Subsequent environmental briefings will be arranged for new staff arriving on the project.
- .3 The cost of attending the above meetings and briefings shall be considered incidental to the Unit Price items and no additional payment will be made.

#### **1.12 MIXING AND STORAGE OF EXPLOSIVES**

- .1 No site for storage of explosives products will be provided to the Contractor. It is the responsibility of the Contractor to store all explosives products **outside** Yoho National Park.

**1.13 WASTE DISPOSAL**

- .1 All surplus, unsuitable, and waste materials shall be removed from the Work site to approved sites outside Yoho National Park. Refer to Section 01 57 19 – Environmental Procedures.
- .2 Depositing any construction debris into any waterway is strictly forbidden.
- .3 Cost for Waste Disposal described above shall be considered incidental to the contract price proposal, and no additional payment will be made.
- .4 Waste Disposal shall be completed in accordance with Section 01 57 19 – Environmental Procedures.

**PART 2 PRODUCTS**

**2.1 NOT USED**

- .1 Not Used.

**PART 3 EXECUTION**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **SECTION 01 25 00 MOBILIZATION AND DEMOBILIZATION**

### **PART 1 GENERAL**

#### **1.1 SCOPE AND INTENT**

- .1 This section includes requirements for one mobilization and one demobilization from the Work site.

#### **1.2 RELATED SECTIONS**

- .1 All.

#### **1.3 DESCRIPTION**

- .1 Mobilization and demobilization consists of preparatory work and operations including, but not limited to, those necessary for moving personnel, materials, equipment, camp, buildings, supplies, shops, offices, incidentals, and other facilities to and from the project sites.
- .2 Mobilization shall include all access road design, construction activities, and materials to allow access to the crest of each slope and reinstatement of the roads at Lower Sherbrooke, Little topple, and Phyllite Slopes. The Access Roads shall be within 5 m of the final face unless authorized by the Departmental Representative.
- .3 Mobilization shall include the supply, maintenance, and demobilization of the Departmental Representative's site offices for 20 weeks at the Hoodoo Creek Campground or other approved site.

#### **1.4 MEASUREMENT PROCEDURES**

- .1 Payment shall be made under "Lump Sum Price Item 1 – Mobilization/Demobilization".
- .2 70% of Lump Sum Contract Price for Mobilization and Demobilization to be paid when mobilization to site is complete.
- .3 The Remainder of Lump Sum Price for 2015 Mobilization and Demobilization is to be paid when work is complete and all materials, equipment, camp, buildings, supplies, shops, offices, incidentals, and other facilities have been removed from site, and the site has been cleaned and left in a condition that satisfies the Departmental Representative and all other Agencies having Jurisdiction.
- .4 Demobilization and subsequent rebobilization due to incomplete work will not be measured for payment.

### **PART 2 PRODUCTS**

#### **2.1 NOT USED**

- .1 Not Used.

**PART 3        EXECUTION**

**3.1        NOT USED**

.1        Not Used.

**END OF SECTION**

## **SECTION 01 31 00 PROJECT MANAGEMENT AND COORDINATION**

### **PART 1 GENERAL**

#### **1.1 SCOPE AND INTENT**

- .1 This section includes the requirements for Project Management and Coordination during the Work, including organization and start-up, on-site documents, scheduling, meetings, and submittals.

#### **1.2 RELATED SECTIONS**

- .1 Section 01 11 00 – Summary of Work.
- .2 Section 01 33 00 – Submittal Procedures.
- .3 Section 01 57 19 – Environmental Procedures.
- .4 Section 01 52 00 – Construction Facilities.
- .5 Section 01 77 00 – Closeout Procedures.

#### **1.3 COORDINATION**

- .1 The Contractor shall coordinate progress schedules, submittals, use of site, temporary utilities, construction facilities, construction Work, and Work by others, under the direction of the Departmental Representative.
- .2 The Contractor shall coordinate with other contractors, subcontractors, and stakeholders at the Work site to develop a schedule agreeable to all parties to carry out the Work without interruption.

#### **1.4 CONSTRUCTION ORGANIZATION AND START-UP**

- .1 Within seven (7) days after award of Contract, the Contractor shall attend a start-up meeting to discuss administrative procedures and responsibilities. Senior representatives of PCA, the Engineer of Record, the Departmental Representative, the Contractor, major Subcontractors, field inspectors, and supervisors are to attend the start-up meeting. The meeting will be held in Yoho National Park (time and location to be determined), and will be chaired by the Departmental Representative.
- .2 The start-up meeting agenda will include:
  - a. Appointment of official representatives of participants in Work.
  - b. Schedule of Work and progress scheduling.
  - c. Requirements for temporary facilities, offices, storage sheds, utilities, and fences in accordance with Section 01 52 00 – Construction Facilities.
  - d. Site safety and security in accordance with Section 01 52 00 – Construction Facilities and Section 00 73 19 – Health and Safety Requirements.
  - e. Quality Control for all Work activities.



- f. Proposed changes, change orders, approvals required, mark-up percentages, time extensions, and other administrative requirements and procedures.
  - g. Monthly progress claims, photographs, and holdbacks.
  - h. Insurances, blasting licenses, and transcript of policies.
  - i. Other business.
- .3 All Work shall comply with the Departmental Representative's allocation of laydown areas on site for field offices and sheds, access, traffic, parking, sanitary facilities, and use of temporary utilities and construction facilities.
- .4 The Contractor shall coordinate intra-project communications including submittals, reports and records, schedules, coordination of Drawings, recommendations, and resolution of ambiguities and conflicts through the Departmental Representative.
- .5 The Contractor shall coordinate with the Departmental Representative to review and layout the proposed work at each site prior to the start of work at that site.

## **1.5 ON-SITE DOCUMENTS**

- .1 The Contractor shall maintain at the job site, one up-to-date copy of the following:
- a. Contract Drawings, Specifications, and Addenda.
  - b. Change Orders and other modifications to the Contract.
  - c. Traffic Management Plan.
  - d. Safety Plan.
  - e. WHMIS documentation and all Health and Safety records.
  - f. Environmental Protection Plan.
  - g. Field test reports.
  - h. Proposed and As-built Blasting Plans for each blast.
  - i. Copy of approved Work Schedule.
  - j. Labour conditions and wage schedules.
  - k. Applicable editions of municipal regulations and by-laws.

## **1.6 SCHEDULES**

- .1 The Contractor shall submit a preliminary construction progress schedule to the Departmental Representative coordinated with PCA's project schedule in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Following review by the Departmental Representative, the Contractor shall revise and resubmit the schedule as required to comply with the current project schedule.

- .3 The Contractor shall periodically revise and resubmit the schedule as directed by the Departmental Representative.
- .4 In addition to the project schedule, weekly schedules shall be submitted to the Departmental Representative, outlining the Work completed to date, as well as anticipated work to be performed each day of the following week. The report should provide information on the location of work, materials, equipment, and staffing requirements.

## **1.7 CONSTRUCTION PROGRESS MEETINGS**

- .1 Progress meetings with the Departmental Representative and the Contractor shall be held weekly, unless otherwise specified by the Departmental Representative.
- .2 The progress meeting agenda shall include:
  - a. Review and approval of previous meeting minutes.
  - b. Review of environmental issues.
  - c. Review of Traffic Control and Emergency response protocol issues.
  - d. Review of site safety and security issues.
  - e. Review of Contractor issues and coordination with other subcontractors or stakeholders.
  - f. Review of progress of Work since previous meeting.
  - g. Discussion of field observations, problems and conflicts.
  - h. Review of off-site fabrication delivery schedules.
  - i. Review of submittal schedules.
  - j. Corrective measures and procedures to regain projected schedule (as required).
  - k. Revisions to construction schedule.
  - l. Weekly progress schedule during succeeding work period.
  - m. Review of quality issues and reports since previous meeting.
  - n. Review of construction budget, progress payments and variances from contract.
  - o. Other business.

## **1.8 SUBMITTALS**

- .1 The Contractor shall submit a Monthly Progress Report to the Departmental Representative including, at a minimum, an update on construction progress, an updated schedule, and any anticipated changes to the work scope.
- .2 The Contractor shall submit a Daily Quantity Sheet the following business day to the Departmental Representative including, but not limited to, measured quantities of rock

blasted, trimmed and hauled, total length drilled, number of holes drilled, number of rock bolts, and other relevant information.

- .3 The Contractor shall submit an email, by 07:00 hrs, detailing anticipated loading times for each blast location to permit the Departmental Representative time to undertake Quality Assurance tasks.
- .4 The Contractor shall submit an email the day before drilling starts, detailing the limits of a blast, which generic blast plan will be used, the anticipated Peak Particle Velocity at a sensitive structure (if any), and the anticipated final wall results.
- .5 The Contractor shall submit requests for payment to the Departmental Representative for review and transmittal.
- .6 The Contractor shall submit requests for interpretation of Contract Documents, and obtain instructions through the Departmental Representative.
- .7 The Contractor shall process Change Orders through the Departmental Representative.
- .8 The Contractor shall deliver closeout submittals for review and preliminary inspections to the Departmental Representative for transmittal.
- .9 Requests for Information (RFIs) and Requests for Variance (RFVs): Any RFIs or RFVs shall receive a response within fourteen (14) calendar days. Each RFI or RFV shall be uniquely numbered and shall be in electronic PDF format.
- .10 Non-conformances (NC) shall be resolved prior to issuance of the Certificate of Substantial Completion.

## **1.9 PROJECT CLOSEOUT**

- .1 The Contractor shall undertake project closeout in accordance with Section 01 77 00 – Closeout Procedures.

## **1.10 MEASUREMENT**

- .1 Project Management shall be considered incidental to the Contract and shall not be measured for payment.

## **PART 2 PRODUCTS**

### **2.1 NOT USED**

- .1 Not Used.

## **PART 3 EXECUTION**

### **3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## SECTION 01 33 00 SUBMITTAL PROCEDURES

### PART 1 GENERAL

#### 1.1 SCOPE AND INTENT

- .1 This section provides requirements for project submittals including administrative procedures and required Contractor submittals.

#### 1.2 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

#### 1.3 RELATED SECTIONS

- .1 Section 01 14 00 – Work Restrictions.
- .2 Section 00 73 19 – Health and Safety Requirements.
- .3 Section 01 55 26 – Traffic Management.
- .4 Section 01 57 19 – Environmental Procedures.
- .5 Section 01 78 00 – Closeout Submittals.
- .6 Section 31 23 21 – Rock Blasting.
- .7 Section 31 72 13 – Anchoring.

#### 1.4 REFERENCES

- .1 Not used.

#### 1.5 ADMINISTRATIVE

- .1 The Contractor shall provide submittals to the Departmental Representative for review within the specified time, or if not as specified, then within reasonable promptness so as not to delay the Work. Failure to provide submittals in ample time is not considered sufficient reason for an extension of Contract Time.
- .2 The submittals shall be in electronic format (PDF) sent by email to the Departmental representative. Details will be provided during the start up meeting.
- .3 Work affected by a submittal shall not proceed until review is complete and the submittal has been deemed acceptable by the Departmental Representative.
- .4 All information shall be submitted in SI/Metric Units. Where information is not produced in SI/Metric units, the Contractor is required to convert the units to metric.
- .5 All submittals and associated information shall be in English.

- .6 All documents shall be clearly, accurately, and unambiguously marked with the associated date of the document. Where a document has been revised and resubmitted, it shall bear record of the revision by revision number or letters and dates.
- .7 The Contractor shall review all submittals prior to providing to the Departmental Representative. This review represents that the necessary requirements have been determined and verified (or will be verified), and that each submittal has been checked and coordinated with the requirements of the Work and Contract Documents. Submittals not stamped, signed, and dated by the Contractor, and identified to the specific project, will be returned without being examined and shall be considered rejected.
- .8 Identify in writing to the Departmental Representative at time of submission any deviations from requirements of the Contract Documents and state reasons for deviations.
- .9 The Contractor shall verify that field measurements are correct. Whenever survey records are provided, the Contractor shall satisfy itself as to the accuracy and completeness of the survey records provided by the Departmental Representative or others for any area before commencing construction in that area.
- .10 The Contractor shall coordinate adjacent work areas and liaise with other stakeholders to ensure the work program is efficiently executed.
- .11 The Contractor's responsibility for errors and omissions in submissions is not relieved by Departmental Representative's review of submittals.
- .12 The Contractor's responsibility for deviations in submissions from requirements of the Contract Documents is not relieved by Departmental Representative's review.
- .13 The Contractor shall keep a reviewed copy of each submission on site.

## **1.6 SHOP DRAWINGS AND PRODUCT DATA**

- .1 The Contractor shall submit manufacturer's data sheets for all explosives, anchorages, concrete guardrails, fencing, and all other products to be incorporated into the Work prior to their use on the Work site.

## **1.7 CERTIFICATES AND TRANSCRIPTS**

- .1 Immediately after award of Contract, the Contractor shall submit the Contractor's Workers' Compensation Board status to the Departmental Representative.
- .2 Immediately after award of Contract, the Contractor shall submit a transcription of their insurance coverage and policy to the Departmental Representative.

## **1.8 REQUIRED CONTRACTOR SUBMITTALS**

- .1 General
  - a. This section identifies the plans, programs, and documentation required prior to mobilization to site, during the construction phase, and upon project completion.
  - b. The Contractor shall not construe the Departmental Representative's review and authorization of the submittals to imply approval of any particular method or sequence for conducting the Work. Authorization of the programs shall not relieve the

Contractor from the responsibility to conduct the Work in strict accordance with the requirements of Federal or Provincial regulations, this specification, or to adequately protect the health and safety of all workers involved in the project and any members of the public who may be affected by the project. The Contractor shall remain solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.

.2 Pre-Mobilization Submittals

- a. The Contractor shall submit the following plans and programs to the Departmental Representative for review a minimum of fourteen (14) days prior to mobilization to the project site. The Contractor shall not begin any site Work until the Departmental Representative has authorized acceptance of the submittals in writing.
- b. Project Schedule detailing milestone dates, schedule of workdays, and manpower required to complete each project activity. In addition, for each activity critical elements that could impact the schedule are to be identified.
- c. A list of subcontractors, suppliers and consultants, and their role and key personnel, including names, positions, and phone numbers.
- d. Contractor Chain of Command, listing the key Contractor personnel, names and positions, addresses, email addresses, telephone and/or pager numbers. The list shall include contact persons who are available on a 24-hour basis in the event of emergencies.
- e. A Work Plan describing the Contractor's intended methods of construction including, but not limited to, methods of construction, required equipment, required material, required personnel, environmental mitigation strategies, and projected number of personnel on site.
- f. Site-specific Traffic Management Plan in accordance with the requirements of Section 01 55 26 – Traffic Management.
- g. Construction Access Plan in accordance with Section 01 55 13 – Construction Access Roads.
- h. Survey Plan describing the Contractor's intended methods of surveying for the project.
- i. Environmental Protection Plan (EPP) in accordance with Section 01 57 19 - Environmental Procedures.
- j. Blasting Safety Plan, describing special procedures to be followed during rock blasting to ensure protection of the public and workers in accordance with Section 00 73 19 – Health and Safety Requirements.
- k. Emergency Response Protocol detailing the Contractor's procedures for management of emergency situations and providing a response plan, protocols, and contact information in accordance with Section 00 73 19 – Health and Safety Requirements. PCA can supply the Contractor with contact names and numbers for emergency response purposes.

- l. General Blasting Plan for the blasting work in accordance with Section 31 23 21 – Rock Blasting.
- m. Occupational Health And Safety Program - The Contractor shall have a Certificate of Recognition (COR) or Registered Safety Plan (RSP) including a site-specific Health and Safety Plan acceptable to the Departmental Representative in accordance with Section 00 73 19 – Health and Safety Requirements. The Contractor shall implement and maintain the Health and Safety Plan during the Work.
- n. Common Excavation Disposal and Hauling Plan detailing disposal/stockpile site locations and Ownership.
- o. Anchor Installation Procedure in accordance with Section 31 72 13 – Anchoring.
- p. Workers Accommodation Camp Plan in accordance with Section 01 52 00 – Construction Facilities.

.3 Construction Phase Submittals

- a. Clearing and Grubbing plans in accordance with Section 31 11 00 – Clearing and Grubbing.
- b. Proposed Blast Designs in accordance with Section 31 23 21 – Rock Blasting.
- c. Anchor Installation Record in accordance with Section 31 72 13 – Anchoring.
- d. Monthly Progress Reports in accordance with Section 01 31 00 – Project Management and Coordination.
- e. Weekly progress reports in Accordance with Section 01 31 00 – Project Management and Coordination.
- f. Daily Quality Control Inspection Reports summarizing the results of all Quality Control inspections conducted by the Contractor. A summary of all Quality Control inspections shall be submitted by the Contractor with each request for payment.
- g. Daily Quantity Sheet in accordance with Section 01 31 00 – Project Management and Coordination.
- h. Pre-Construction Condition Survey. The Contractor shall submit a survey of the pre-existing conditions at each work site prior to undertaking scaling, blasting, trimming, or other work that could damage existing infrastructure in accordance with Section 31 23 21 – Rock Blasting and Section 31 23 20 – Rock Scaling. The Pre-Construction Condition Survey shall be in a format acceptable to the Departmental Representative and include digital photos, measurements, and written descriptions as appropriate to document the existing conditions.
- i. Blasting Consultant Field Reports in accordance with Section 31 23 21 – Rock Blasting.
- j. As-Built Blasting Record in accordance with Section 31 23 21 – Rock Blasting.
- k. Work Site Health and Safety Inspection Report (weekly) – Submit weekly in accordance with Section 00 73 19 – Health and Safety Requirements.

.4 Project Completion Submittals

- a. Closeout submittals in accordance with Section 01 78 00 – Closeout Submittals.
- b. Redline drawings

**PART 2 PRODUCTS**

**2.1 NOT USED**

.1 Not Used.

**PART 3 EXECUTION**

**3.1 NOT USED**

.1 Not Used.

**END OF SECTION**



## SECTION 01 42 16 GENERAL DEFINITIONS

### PART 1 GENERAL

#### 1.1 SCOPE AND INTENT

- .1 This section includes general definitions that are applicable to all Sections of the Project Specifications.

#### 1.2 REQUIREMENTS

- .1 In the event of a discrepancy, the definitions in the Specifications shall be taken as correct.

#### 1.3 GENERAL DEFINITIONS

- .1 Parks Canada Agency (PCA): The Owner of the rock slopes.
- .2 Geotechnical Engineer of Record: The registered Professional Engineer (or designated representative) retained by Parks Canada responsible for evaluating the suitability of the blasting and verifying the compliance with specifications.
- .3 Departmental Representative: On-site engineer representing the Geotechnical Engineer of Record.
- .4 Contractor: The organization or company retained by PCA to complete the construction work.
- .5 Canadian Pacific Railway: Rail infrastructure owner and Stakeholder in the project.
- .6 Environmental Surveillance Officer (ESO): A representative of PCA, or appointed delegate, responsible for overseeing the compliance with Environmental Regulations within the Park, and to enforce the National Parks Act. Directions from the ESO to the Contractor will typically be made through the Departmental Representative.
- .7 Substantial Completion: Stage or designated portion of a construction project that is sufficiently complete in accordance with a contract for the owner to occupy and/or use the Project Site as intended, without undue interference.
- .8 Final Review: The Departmental Representative's inspection of the final product, after a formal request in writing from the Contractor, during which a deficiencies list will be developed with the Contractor.
- .9 Anchorage: A tendon installed in a drilled and grouted hole in the ground (soil or rock) that could be stressed (rock bolt) or unstressed (dowel).
- .10 Well graded: For a gravel the Coefficient of Conformity ( $C_u$ ) shall be greater than 3 and greater than or equal to 6 for a sand. Both sands and gravels shall have a Coefficient of Conformity ( $C_c$ ) between one and three ( $1 < C_c < 3$ ).

END OF SECTION

## SECTION 01 52 00 CONSTRUCTION FACILITIES

### PART 1 GENERAL

#### 1.1 SCOPE AND INTENT

- .1 This section includes requirements for Construction Facilities for the Work including site storage/loading, construction parking, security, offices, construction camps, equipment, tool and material storage, sanitary facilities, and construction signage.

#### 1.2 RELATED SECTIONS

- .1 Section 01 55 13 – Construction Access Roads.

#### 1.3 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

#### 1.4 INSTALLATION AND REMOVAL

- .1 Provide Construction Facilities in order to execute work expeditiously and in accordance with all Project Specifications and regulations.
- .2 Remove all Construction Facilities from site after use.

#### 1.5 SITE STORAGE/LOADING

- .1 Confine the Work and operations of employees in accordance with the Contract Documents. Do not unreasonably encumber Work areas with products or material.
- .2 Do not load any part of the Work area with a weight or force that will endanger the Work or site personnel.

#### 1.6 CONSTRUCTION PARKING

- .1 Provide and maintain adequate access and parking at the project site in areas approved by the Departmental Representative.
- .2 Build and maintain temporary roads in accordance with Section 01 55 13 – Construction Access Roads and provide snow removal during the period of Work.
- .3 If authorized to use existing roads for access to project site, maintain such roads for the duration of Contract and repair, to the satisfaction of the Departmental Representative, damage resulting from Contractor's use of roads.

#### 1.7 SECURITY

- .1 If required by the Contractor, the Contractor shall provide and pay for security personnel to guard the Work, work site, and contents of site after working hours, during holidays, and during extended shutdowns. The Contractor is advised that some random acts of vandalism to equipment have occurred within the National Parks.

## **1.8 OFFICES**

- .1 The Contractor shall provide a clearly marked and fully stocked first aid case in a readily available location in all site offices.
- .2 With approval from the Departmental Representative, Subcontractors may provide their own offices as necessary. The office locations shall be determined by the Departmental Representative.
- .3 The Contractor shall provide a stand-alone, temporary site office the exclusive use of the Departmental Representative, which shall comply with the following:
  - a. Uninterrupted power supply and heat for office.
  - b. Inside dimensions minimum 14.6 m long x 7.3 m wide x 2.4 m high, with floor 0.3 m above grade, complete with four 50% opening windows and one lockable door.
  - c. Insulate the building and provide heating system to maintain 21°C inside temperature at -20°C and 25°C outside temperature.
  - d. Finish inside walls and ceiling with plywood, hardboard, or wallboard and paint in selected colours. Finish floor with 19 mm thick plywood.
  - e. Install electrical lighting system to provide a minimum of 750 lux using surface mounted, shielded commercial fixtures with 10% upward light component.
  - f. The office shall have two (2) separate interior closed offices.
  - g. Provide private washroom facilities adjacent to the office complete with flush or chemical type toilet, lavatory, and mirror, and maintain supply of paper towels and toilet tissue.
  - h. Equip the office with a 1 m x 2 m table, four (4) chairs which can be stacked, 6 m of shelving 300 mm wide, one (1) three-drawer filing cabinet, one (1) plan rack, and one (1) coat rack and shelf.
  - i. Equip the meeting room with a 2.4 m long meeting room table and eight (8) chairs that can be stacked.
  - j. Include a kitchenette with a small fridge, a sink, and a microwave.

## **1.9 CONSTRUCTION CAMP**

- .1 The Contractor may establish a construction camp in the Hoodoo Creek Campground (km 120+380). The size of area available for a camp will be determined by the Departmental Representative. The Contractor's Camp shall be limited to accommodation of Contractor's personnel only.
- .2 The Contractor shall submit a Workers Accommodation Camp Plan prior to mobilizing to the site regarding structures, layout, vehicles, operations required at this location, to the satisfaction of the Departmental Representative. Particular attention shall be given to managing foods and waste products that may attract wild animals. An electric surround fence may be required in the event of bear attraction problems. The site will be shared with other Contractors. All ordinances, laws, rules, and regulations set out in the Canada National Parks Act and Regulations shall apply.

- .3 The Contractor shall provide toilets and maintain them in a clean and sanitary condition at the camp. These facilities shall be used solely for the disposal of human body wastes.
- .4 Pets shall not be brought to or maintained at the construction site or worker's camp.
- .5 The construction site camp with within the confines of Yoho National Park. The Contractor is advised that the condition of the camp and the actions of the Contractor (or off duty personnel). The construction site camp is within the confines of Yoho National Park. The contractor is advised that the condition of the camp and the activities of the contractor or off duty personnel shall not be policed by Parks or the Departmental Representative. The continual use of the camp by the contractor is subject to both good management and responsible behavior of the contractor's personnel. Should incidents occur, including but not limited to fires, animal disturbance, vegetation disturbance, drunken disorderly behavior, driving when impaired, etc. Then a member of the contractor personnel may be asked to be removed from the camp. In the event of a continued or more serious breach by either/or irresponsible behavior or poor camp management, then all is the contractors personnel maybe instructed to leave the camp. In such an event, additional costs associated with accommodation and/or mileage and other cost will be borne by the Contractor.

#### **1.10 EQUIPMENT, TOOL, AND MATERIALS STORAGE**

- .1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment, and materials.
- .2 Store materials not in use on site in weatherproof sheds with work activities and minimize aesthetic impacts.

#### **1.11 SANITARY FACILITIES**

- .1 The Contractor shall provide and maintain a minimum of two (2) portable sanitary facilities (toilets), one at either end of each traffic control area, for use by both the Contractor and the Public, in accordance with governing regulations and Environmental Procedures for this project. These facilities shall be moved as the work progresses from rock face to rock face.
- .2 The facilities noted in Clause 1.11.1 above shall be maintained at least once a week and consumables replenished as required by the Contractor with no additional cost to the Project.
- .3 Post notices and comply with requirements of the local health authorities. Keep area and premises in sanitary condition.

#### **1.12 CONSTRUCTION SIGNAGE**

- .1 No signs or advertisements other than warning signs are permitted on site.
- .2 Signs and notices for safety and instruction shall be in both official languages. Graphic symbols shall conform to CAN3-Z321.
- .3 Approved signs and notices shall be maintained in good condition for the duration of project, and removed from site upon completion, or earlier if directed by Departmental Representative.

**PART 2 PRODUCTS**

**2.1 NOT USED**

.1 Not Used.

**PART 3 EXECUTION**

**3.1 NOT USED**

.1 Not Used.

**END OF SECTION**

## **SECTION 01 55 26 TRAFFIC MANAGEMENT**

### **PART 1 GENERAL**

#### **1.1 SCOPE AND INTENT**

- .1 This section includes requirements for traffic management including informational and warning devices, protection and control of public traffic, and operational requirements.

#### **1.2 PRECEDENCE**

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

#### **1.3 RELATED SECTIONS**

- .1 Section 01 14 00 – Work Restrictions.
- .2 Section 00 73 19 – Health and Safety Requirements.
- .3 Section 01 55 13 – Construction Access Roads.

#### **1.4 MEASUREMENT PROCEDURES**

- .1 No measurement as such will be made for Traffic Management, and for preparing and implementing the Traffic Management Plans, for the Contractor to meet the requirements of this section. The Departmental Representative will review that the measures detailed within the Traffic Management Plans are being implemented.

#### **1.5 REFERENCES**

- .1 Uniform Traffic Control Devices for Canada, (UTCD) September 1998 (distributed by Transportation Association of Canada), and subsequent amendments.
- .2 Manual of Uniform Traffic Control Devices for Streets and Highways, US FHWA, Part IV, 2009, and subsequent amendments.
- .3 BC Traffic Control Manual for Work on Roadways (1999) and subsequent amendments.

#### **1.6 QUALITY CONTROL**

- .1 All quality control for Traffic Management will be the responsibility of the Contractor.

#### **1.7 GENERAL**

- .1 The Contractor shall develop and implement a Traffic Management Plan in accordance with the requirements of the BC MoTI 2012 Standard Specifications for Highway Construction, Section 194 – Traffic Management for Work Zones, except where specified otherwise. The Traffic Management Plan shall be submitted to the Departmental Representative a minimum of fourteen (14) days prior to mobilization to site and be accepted by the Departmental Representative prior to commencement of the site work.
- .2 Traffic Management Plan shall include special requirements for traffic management during blasting.

- .3 The Traffic Management Plan shall include plans specific to each traffic management location that needs to be established during construction.
- .4 The Traffic Management Plan must specifically address and identify measures to deal with site-specific hazards along the TransCanada Highway, such as steep gradients, areas of heavy pedestrian traffic, or areas of rock fall hazard.
- .5 The Contractor shall design, supply, erect, move, and maintain all traffic management devices, signs and other safety measures and provide staff to ensure safe passage of all traffic from commencement of site work to date of acceptance by the Departmental Representative.
- .6 All traffic and warning signs shall be either bilingual or of a symbolic or pictorial type. If bilingual signs are used, the English and French message shall be of equal letter size and at same elevation, with English on left and French on right. Assistance in translation of construction and warning signs to French may be obtained from PCA. All signs shall be "Diamond Grade" reflectivity.
- .7 All speed limits, traffic management, and warning signs shall have an 'NPC' adhesive sticker added to bottom right-hand corner. These stickers will be supplied by PCA following the Departmental Representative's acceptance of the Contractor's Traffic Management Plan.
- .8 The Work shall be staged and/or detour roads provided, with the appropriate controls in place, so that two lanes of highway traffic are maintained through the work zone at all times throughout the construction unless otherwise approved by the Departmental Representative.
- .9 The Contractor shall coordinate traffic management procedures with other Contractors working in the area.
- .10 The Contractor shall keep a log of all traffic holds during the course of each day on site that shall include time of start of traffic hold, time at end of traffic hold, and explanation of exceedances of time hold limits, if any.
- .11 Median barriers may be removed to reduce haul times if using the "AB/BC Border" storage site as long as the appropriate traffic controls are implemented. Any removed infrastructure shall be reinstated for statutory holidays and project completion.

## **1.8 PROTECTION OF PUBLIC TRAFFIC**

- .1 The Contractor will comply with requirements of Acts, Regulations, and By-Laws in force for regulating traffic or using roadways upon or over which it is necessary to carry out Work or haul materials or equipment.
- .2 When working on travelled way:
  - a. Place equipment in position to present minimal interference and hazard to travelling public.
  - b. Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.
  - c. Do not leave equipment on travelled way overnight.

- .3 Do not close any lanes of the road without approval of Departmental Representative. Before re-routing traffic erect suitable signs and devices in accordance with instructions contained in Part D of Uniform Traffic Control Device for Canada (UTCD).
- .4 Keep travelled way graded, free of potholes and debris, and of sufficient width to accommodate two 3.7 m wide lanes for traffic, one in each direction.
- .5 In accordance with the Construction Access Plan outlined in Section 01 55 13 – Construction Access Roads, provide paved detours to facilitate passage of traffic around restricted construction area, within the existing paved width of the Highway. In active work zones where the shoulder width has been reduced:
  - a. Traffic barriers shall be provided on both sides of the roadway.
  - b. The reduced speed limit shall be 50 km/h or slower if the conditions dictate.
  - c. The Contractor shall provide temporary lighting of the roadway from dusk until dawn throughout the periods where detours are constructed and in use. These lights shall be capable of providing adequate illumination of the work site and detour without blinding drivers of approaching vehicles on the highway. The Contractor shall provide power supply for temporary lighting throughout the construction period.
  - d. The Contractor shall provide competent supervision and/or contract personnel as required during non-working hours to ensure that safety flares, flashing beacons, signs, lights, and other equipment are in proper working order.
  - e. The Departmental Representative will monitor traffic management measures and may require modifications of these measures from time to time to achieve satisfactory traffic flow, safety of travelling public, and coordination with adjacent contracts.
- .6 Provide and maintain road access and egress to property fronting along Work under the Contract and in other areas as indicated, unless other means of road access exist that meet approval of Departmental Representative.
- .7 The Contractor shall maintain a dust free construction zone. The contractor is required to supply dust management equipment on site for the duration of the project such as a power sweeper, water truck, or other equipment approved by the Departmental Representative.

## **1.9 INFORMATIONAL AND WARNING DEVICES**

- .1 Provide and maintain signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from the Work that require road user response.
- .2 Supply and erect signs, delineators, barricades, and miscellaneous warning devices as specified in the Traffic Management Plan.
- .3 Place signs and other devices to standards and in locations recommended in BC Traffic Control Manual for Work on Roadways (1999) and subsequent amendments. Provide intermediate signage if work zones exceed 1.0 km in length.
- .4 Signs shall be wind resistant.



- .5 Prior to the commencement of Work, the Contractor is to provide for the Departmental Representative's review, a Detour/Traffic Management Plan outlining signs and other devices required for the project. If the situation on site changes, the Plan shall be revised and resubmitted for the approval of the Departmental Representative.
- .6 Continually maintain traffic management devices in use by:
  - a. Checking signs daily for legibility, damage, suitability, and location. Clean, repair or replace to ensure clarity and reflectance.
  - b. Removing or covering signs that do not apply to existing conditions.

#### **1.10 CONTROL OF PUBLIC TRAFFIC**

- .1 Provide competent Traffic Control Persons (TCPs), trained in accordance with, and properly equipped as specified in the BC Traffic Control Manual for Work on Roadways (1999) (or Alberta Traffic Control Standards, if required) and subsequent amendments for Work on Roadways:
  - a. When public traffic is required to pass working vehicles or equipment that block all or part of travelled way.
  - b. When stoppage of public traffic is required due to rock scaling, blasting, rock bolting, excavation, and other work.
  - c. When it is necessary to institute a one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high, and a traffic signal system is not in use.
  - d. When workmen or equipment are employed on the travelled way over the brow of hills, around sharp curves, or at other locations where oncoming traffic would not otherwise have adequate warning.
  - e. Where temporary protection is required while other traffic management devices are being erected or taken down.
  - f. For emergency protection when other traffic management devices are not readily available.
  - g. In situations where complete protection for workers, working equipment, and public traffic is not provided by other traffic management devices.
  - h. At each end of restricted sections where pilot cars are required.
- .2 The Contractor shall provide and equip responsible TCPs for the direction and control of traffic. The Contractor shall ensure that TCPs are instructed in and use proper traffic management procedures appropriate for the prevailing conditions.
- .3 TCP shall have proof of certification from a recognized training program on traffic management procedures through construction zones. The Departmental Representative will recognize traffic management programs administered by the Alberta Construction Safety Association or BC Road Construction and Maintenance Safety Network; however, the Departmental Representative reserves the right to accept or reject certification from any other institute.

- .4 TCPs shall be dressed in safety apparel (coveralls) that meets the Class 3 Level 2 requirements of the BC Traffic Control Manual for Work on Roadways, High Visibility Safety Apparel. Each pair of coveralls shall have a permanent label affixed certifying compliance with Class 3 Level 2 of CSA Z96-02 or equivalent within the BC Traffic Control Manual for Work on Roadways. The colour of the coveralls shall be fluorescent yellow-green with silver retro reflective striping. The retro reflective striping shall be a minimum of 50 mm wide and shall be sewn onto a 100 mm wide fluorescent red-orange background material. TCPs safety apparel must be kept clean and in good condition. Faded, torn, and/or dirty coveralls, or coveralls without a CSA certification label, will not be acceptable and shall be replaced by the Contractor at the Departmental Representative's discretion.
- .5 TCPs shall also wear fluorescent orange hardhats, and shall be equipped with the traffic control paddles.
- .6 TCPs shall be equipped with two-way radios and back-up batteries.
- .7 During hours of darkness, TCPs shall be additionally equipped with a red signal hand-light of sufficient brightness to be clearly visible to approaching traffic and flagging stations shall be illuminated by overhead lighting. Signs indicating hazardous conditions and signs requiring increased attention shall be marked with flashers.

#### **1.11 OPERATIONAL REQUIREMENTS**

- .1 Maintain existing conditions for traffic throughout the period of contract. When required for construction under contract and when measures have been taken as specified herein and approved by Departmental Representative to protect and control public traffic, existing conditions for traffic are to be restricted as follows:
  - a. Speed limit reduced to 50 km/h in work zones in work periods.
  - b. Maintain existing conditions for traffic crossing right-of-way.
  - c. Post construction advisories on the DriveBC website (<http://www.drivebc.ca>) and update advisories regularly to reflect the current and planned construction activities and highway closures.
  - d. Post construction advisories on the Official Alberta Traffic Advisor website (<http://511.alberta.ca/>) and update advisories regularly to reflect the current and planned construction activities and highway closures.
  - e. Delays to public traffic due to Contractor's operation: maximum 20 minutes, and no longer than 1 km of line up.
  - f. A hold up of up to 45 minutes may be permitted Tuesdays, Wednesdays, and Thursdays between 08:00 hrs and 09:30 hrs with the approval of the Departmental Representative if all other Contractual Restrictions do not apply.
  - g. Emergency vehicles are to be directed through the work site immediately once conditions are safe.
  - h. No stoppage of traffic shall be allowed during inclement weather conditions.

#### **1.12 PAYMENT**

- .1 Payment will be as per the lump sum price in the lump sum price breakdown, pro-rated over the duration of the work.

**PART 2 PRODUCTS**

**2.1 NOT USED**

- .1 Not Used.

**PART 3 EXECUTION**

- .1 Traffic management for the purposes of all aspects of the work including, but not limited to, rock scaling, trim blasting, common excavation, removal and replacement of road barriers, installation of new road barriers, and anchoring shall be undertaken as per this specification.
- .2 The Contractor shall work with paving contractors working in the area so that trucks used in hot asphalt operations may, if safe to do so, bypass the line ups to the front of the queue. This shall be coordinated with the paving contractor.

**END OF SECTION**

## SECTION 01 57 19 ENVIRONMENTAL PROCEDURES

### PART 1 GENERAL

#### 1.1 SCOPE AND INTENT

- .1 This section provides environmental requirements for working within Yoho National Park (YNP) including general and task-specific information.
- .2 This specification is intended to provide procedures and requirements for protection of the environment.

#### 1.2 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

#### 1.3 MEASUREMENT PROCEDURES

- .1 Preparation and implementation of an Environmental Protection Plan (EPP) in accordance with this Section 01 57 19 – Environmental Procedures will not be measured separately for payment and will be considered incidental to the work.

#### 1.4 SUBMITTALS

- .1 The Contractor is required to prepare an EPP in accordance with the information outlined in this Section 01 57 19 – Environmental Procedures.

#### 1.5 NATIONAL PARK REGULATIONS

- .1 The Contractor shall ensure that all work is performed in accordance with the ordinances, laws, rules, and regulations set out in the Canada National Parks Act and Regulations.
- .2 The Contractor and any Subcontractors shall obtain a business license from the PCA Administration Office at YNP, prior to commencement of the contract.
- .3 All Contractors' vehicles are required to display a vehicle work pass from PCA. These permits may be obtained free of charge from PCA.

#### 1.6 CANADIAN ENVIRONMENTAL ASSESSMENT ACT (CEAA)

- .1 Execution of the work is subject to the provisions within the Canadian Environmental Assessment Act (CEAA) Guidelines Order of 2003 and subsequent amendments.
- .2 Failure to comply with or observe environmental protection measures identified in these specifications may result suspension of the work pending rectification of the problems.

#### 1.7 START-UP AND ENVIRONMENTAL BRIEFING

- .1 All staff employed at the construction site will be subject to an Environmental Briefing regarding their individual and collective responsibilities to ensure avoidable adverse environmental impact does not arise from their activities and personal choices. All employees must attend the Environmental Briefing, lasting approximately two (2) hours, before beginning their work at the site. After attending the Environmental Briefing, each employee will be issued a certification sticker to be displayed on his or her helmet.
- .2 New employees may join the Contractors' work force after the initial round of Environmental Briefing. In that case and as required, subsequent Environmental Briefings can be presented as numbers warrant, by arrangement with the Environmental Surveillance Officer (ESO) through the Departmental Representative.

- .3 Some sub-trades may be present at the site for a short time, to perform once-only duties. In these cases, the Environmental Briefing will be replaced by the Contractor explaining the environmental sensitivity of the work location to the sub-trade worker(s), and reviewing highlights of personal conduct expected, with reference to a one-page briefing summary to be provided to the Contractor by the ESO. A copy of this summary will be provided to each sub-trade worker joining the work force.
- .4 The ESO or alternate designated PCA staff member will present the Environmental Briefing.
- .5 PCA will have an ESO attending the site to monitor the construction activity for conformance with the EPP. The ESO's main duties are to monitor the progress of the construction on an ongoing basis to ensure compliance with environmental protection measures, and to provide guidance through the Departmental Representative, in the event of unanticipated environmental problems. Although the ESO has authority to enforce National Parks Act violations, direction to the Contractor will be the duty of the Departmental Representative.

## **1.8 CONSTRUCTION SITE ACCESS AND PARKING**

- .1 The Contractor shall review short-term and long-term construction access requirements with the Departmental Representative, at start-up and throughout . In consultation with the Departmental Representative, the Contractor shall formulate an agreement for worker transportation to and from the work sites and where workers shall park their personal vehicles.
- .2 Workers' personal vehicles are to remain within the construction footprint while parked, and shall be parked at least 10 m from any watercourse.

## **1.9 PROTECTION OF WORK LIMITS**

- .1 The EPP shall instruct the Contractor in how to mark work limits and contain procedures that prevent trespass outside these limits, to the satisfaction of the Departmental Representative and the ESO. The Contractor shall ensure that the environment beyond the work limits is not negatively affected or damaged by workers' vehicles or construction machinery and shall instruct workers on the defined boundaries.

## **1.10 EROSION CONTROL**

- .1 Sediment and erosion control measures that prevent sediment from entering any waterway, water body, or wetland near the construction site shall be implemented by the Contractor.
- .2 On-site sediment control measures shall be constructed and functional prior to initiating activities that may generate sediment or deleterious runoff. The EPP shall include an Erosion Control Plan to the satisfaction of the Departmental Representative and ESO.
- .3 Regular monitoring and maintenance of all erosion control measures shall be the responsibility of the Contractor. Control measures that are not functioning effectively are to be repaired. The Departmental Representative and ESO also will monitor erosion control performance and notify the Contractor of any deficiencies that require rectification.
- .4 The site shall be secured against erosion during periods of construction inactivity.

## **1.11 HAZARDOUS PRODUCTS AND SPILL MANAGEMENT**

- .1 The Contractor shall prevent any deleterious and objectionable materials from entering streams, rivers, wetlands, water bodies, or watercourses that would result in damage to aquatic and riparian habitat.

- .2 The EPP shall include a list of products and materials to be used or brought to the construction site that are hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement, sand blasting agents, and petroleum based products. Hazardous products shall be stored no closer than 100 m from any rivers and their tributaries.
- .3 A Spill Response Plan shall be prepared as part of the EPP and shall detail containment and storage, security, handling, use, and disposal of empty containers, surplus product, or waste generated through use of products outlined in Clause 1.11.2, to the satisfaction of the Departmental Representative and the ESO and in accordance with all applicable Federal and Provincial legislation.
- .4 An impervious berm shall be constructed around fuel tanks and any other potential spill areas. The berm shall be capable of holding 110% of the tank storage volume and shall be to the satisfaction of the Departmental Representative and the ESO before start-up. Measures such as collection/drip trays and berms lined with occlusive material such as plastic and a layer of sand, and double-lined fuel tanks can prevent spills into the environment.
- .5 The Contractor shall provide spill kits at re-fuelling, lubrication, and repair locations that will be capable of dealing with 110% of the largest potential spill and shall be maintained in good working order at all times. The ESO and Departmental Representative must approve these spill kits prior to project start-up. The Contractor and site staff shall be informed of the location of the spill response kits and be trained in their use.
- .6 Timely and effective action shall be taken to stop, contain, and clean up all spills as long as the site is safe to enter. The Departmental Representative and the ESO shall be notified immediately of any spill. If not available, Banff Dispatch shall be immediately contacted at 403-762-4506. Spill response cards will be distributed during the initial Environmental Briefing with basic instructions and phone numbers.
- .7 In the event of a major spill, all other work shall be stopped and all personnel devoted to spill containment and clean up.
- .8 The costs involved in a spill incident (the control, clean up, disposal of contaminants, and site remediation to pre-spill conditions) shall be the responsibility of the Contractor. The site will be inspected to ensure completion to the expected standard and to the satisfaction of the Departmental Representative and ESO.

#### **1.12 EQUIPMENT MAINTENANCE, FUELLING, AND OPERATION**

- .1 The Contractor shall ensure that all soil, seeds, and any debris attached to construction equipment to be used on the project site shall be removed (e.g., by power washing) outside of YNP before delivery to the work site.
- .2 Equipment fuelling sites will be identified by the Contractor and approved by the Departmental Representative and the ESO. Except for chain saws, any fuelling closer than 30 m to any streams, wetlands, water bodies, or waterways shall require the authorization and oversight of the Departmental Representative.
- .3 Diesel and gasoline delivery vehicles, including bulk tankers, shall be parked more than 30 m from any streams, wetlands, water bodies, or watercourses. Manual or electric pump delivery systems shall be used. Gravity-fed fuel systems shall not be used. Fuelling personnel shall maintain presence at and immediate attention to fuelling operations.
- .4 Mobile fuel containers (e.g., slip tanks, small fuel carboys) shall remain in the service vehicle at all times while not used for fueling equipment.

- .5 Equipment used on the project shall be fuelled with E10 (or equivalent) and low sulphur diesel fuels and shall conform to local emission requirements. The Contractor shall ensure that unnecessary idling of vehicles is avoided.
- .6 Oil changes, lubricant changes, greasing, and machinery repairs shall be performed at locations approved by the ESO or the Departmental Representative. Waste lubrication products (e.g., oil filters, used containers, used oil) shall be secured in spill-proof containers and properly recycled or disposed at an approved facility. No waste petroleum, lubricant products, or related materials are to be discarded, buried, or disposed anywhere within a National Park.
- .7 The Contractor shall ensure that all equipment is inspected daily for fluid/fuel leaks and maintained in good working order.
- .8 Fuel containers, lubricant products, or other potentially deleterious substances shall be stored only in secure locations specified by the Departmental Representative and be secured in tamperproof containers. Alternatively, the Contractor may hire security personnel to prevent unauthorized access or damage.

### **1.13 OPERATION OF EQUIPMENT**

- .1 Equipment movement shall be restricted to the construction area. The work limits shall be identified by stake and ribbon or other methods approved by the Departmental Representative. Unless authorized by the Departmental Representative, activities beyond the work limits are not permitted. No machinery shall enter, work in, or cross over streams, rivers, wetlands, water bodies, or watercourses, nor damage aquatic and riparian habitat or trees and plant communities.
- .2 When, in the opinion of PCA, negligence on the part of the Contractor results in damage or destruction of vegetation, or other environmental or aesthetic features beyond the designated work area, the Contractor shall be responsible, at its expense, for complete restoration including the replacement of trees, shrubs, topsoil, grass, and other vegetation to the satisfaction of the Departmental Representative and ESO.
- .3 Vehicle movements shall be restricted to work limits.

### **1.14 FIRE PREVENTION AND CONTROL**

- .1 A fire extinguisher shall be carried and available for use on each machine and equipment.
- .2 Construction equipment shall be operated in a manner and with all original manufacturer's safety devices to prevent ignition of flammable materials in the area.
- .3 Care shall be taken while smoking on the construction site to ensure that the accidental ignition of any flammable material is prevented. Smoking or other activities with the potential to cause a fire may be restricted or prohibited in some of the work areas at the discretion of the ESO and the Departmental Representative depending on the current fire hazard rating.
- .4 In case of fire, the Contractor or worker shall take immediate action to extinguish the fire if safe to do so. The ESO and the Departmental Representative shall be notified of any fire immediately. If not available, Banff Dispatch shall immediately be contacted at 403-762-4506 and 911.
- .5 Fires or burning of waste materials is not permitted.



#### **1.15 WILDLIFE**

- .1 During the Environmental Briefing, all personnel shall be instructed by the ESO on procedures to follow if wildlife appears near or within the work site, as well as any other wildlife concerns.
- .2 If necessary, construction activities shall be scheduled around important wildlife windows.
- .3 Avoid or terminate activities on site that attract or disturb wildlife and vacate the area and stay away from the immediate location if bears, cougars, wolves, elk or moose display aggressive behavior or persistent intrusion. Extra care to control materials that might attract wildlife (e.g., food or food scraps) shall be exercised at all times (see Clause 1.17.5).
- .4 Notify the ESO and Departmental Representative immediately about dens, litters, nests, carcasses (road kills), bear activity, or encounters on or around the site or crew accommodation. Other wildlife-related encounters are to be reported within 24 hours. If the ESO or Departmental Representative is not available, Lake Louise Dispatch shall be contacted at 403-762-4506.

#### **1.16 RELICS, FOSSILS, AND ANTIQUITIES**

- .1 Artifacts, relics, fossils, antiquities, and items of historical interest such as cornerstones, commemorative plaques, inscribed tablets, and similar objects found on the work site shall be reported to the ESO or the Departmental Representative immediately. The Contractor and workers shall wait for instructions before proceeding with their work.
- .2 All historical or archaeological objects found in YNP are protected under the National Parks Act and Regulations and are the property of PCA. The Contractor and workers shall protect any articles found and request direction from the ESO or the Departmental Representative.

#### **1.17 WASTE MATERIALS STORAGE AND REMOVAL**

- .1 The Contractor shall dispose of hazardous wastes in conformance with the Environmental Contaminants Act, applicable Provincial regulations, and the Code of Good Practice for Management of Hazardous and Toxic Wastes at Federal Establishments.
- .2 All wastes originating from construction, trade, hazardous, and domestic sources shall be kept separate for disposal in separate waste streams where available or required.
- .3 Construction, trade, hazardous, and domestic waste materials shall not be burned, buried, or discarded at the construction site or elsewhere within YNP. These wastes shall be contained and removed in a timely and approved manner by the Contractor and workers, and disposed at appropriate waste landfill and recycling sites located outside the park. Construction waste storage containers, provided by the Contractor, shall be emptied by the Contractor when 90% full. Waste containers shall have lids, and waste loads shall be covered while being transported.
- .4 The Contractor and workers shall make efforts to reduce, reuse, and recycle materials.
- .5 All efforts to prevent wildlife from obtaining food, garbage, or other domestic wastes shall be made by the Contractor and workers while undertaking work in National Parks. Such wildlife attractants shall not be stored at the work site overnight. Lunches, coolers, and food products, including waste food products, shall be securely stored away from access by animals. Daily removal from YNP and off-site disposal of food scraps, food wrappers, pop cans, domestic waste, and other potential wildlife attractants is mandatory. Existing PCA waste receptacles shall not be used for disposal of such wastes without prior arrangement with PCA.



- .6 The Contractor and workers shall immediately report any circumstances related to food/garbage and wildlife to the ESO or the Departmental Representative. If neither can be reached, the Contractor/worker shall immediately contact Lake Louise Dispatch at 403-762-4506.
- .7 Sanitary facilities shall be provided and maintained in accordance with Section 01 52 00 – Construction Facilities.

#### **1.18 MISCELLANEOUS SITE MANAGEMENT PRACTICES**

- .1 Removal and storage of snow shall be the Contractor's responsibility and arranged with the ESO and the Departmental Representative.
- .2 The Contractor shall control blowing dust and debris generated from the construction site by means such as covering or wetting down dry materials and rubbish. Dust control measures for temporary access roads may also have to be initiated.
- .3 Security services at the work site may be necessary during the contract, especially during quiet times. Fuel tanks or other potentially deleterious substances shall be secured to ensure they are tamperproof and cannot be drained by unauthorized parties.
- .4 Pets shall not be brought to or maintained at the construction site.
- .5 The Contractor shall prevent blowing dust and debris by covering and/or providing dust control by methods approved by the Departmental Representative or ESO.
- .6 Constuction access within 30 m of a stream will not be permitted.

### **PART 2 PRODUCTS**

#### **2.1 NOT USED**

- .1 Not Used.

### **PART 3 EXECUTION**

#### **3.1 CLEARING AND GRUBBING**

- .1 The Contractor shall ensure that substrate or riparian area of streams, rivers or watercourses, whether open water or frozen over, shall not be disturbed by tracked, wheeled, or self-propelled equipment, (e.g., skidder, truck). The ESO or Departmental Representative will provide direction in the case of work occurring near any wetland area or watercourses.
- .2 The Contractor shall take all measures to ensure that trees do not fall into streams, rivers, wetlands, or water bodies or outside the clearing limits as marked by colored flagging. Generally, work within 30 m of watercourses, water bodies, or wetlands requires the oversight of the ESO or the Departmental Representative.
- .3 Trees inadvertently felled into streams, rivers, watercourses, or outside the clearing limits shall be removed by means (e.g., winch) that do not damage the substrate or any standing trees outside the clearing limits. Machinery shall remain within clearing limits, and shall not enter streams, rivers, watercourses, or water bodies to remove felled trees.
- .4 Logs and other salvage materials are to be conveyed to and placed at the storage site without spread of debris or damage to other standing trees or landscape resources outside the marked clearing or storage limits. They shall not be skidded through wetlands, waterways, or water bodies.
- .5 During grubbing, stumps, roots, embedded logs, and other non-soil debris shall be transported to locations as shown on the Construction Drawings.

- .6 No slash clearing, pickup, or grubbing shall occur outside the designated area or within 1 m of the drip line of existing forest.
- .7 Existing areas of vegetation disturbed as a result of the Work shall be rehabilitated using approved topsoil from the park and a native grass seed mix (tbc if required).

### **3.2 STRIPPING**

- .1 A contingency plan for control of dust generated from the construction site shall be prepared, with arrangements made as needed for material availability. If the work program is shut down during inclement weather, erosion control of bared soils or excavated materials stockpiles will be required. The Contractor's EPP will describe measures to be implemented in such a circumstance.
- .2 Stripping close to the any watercourse, water body, or wetland shall employ methods to ensure materials do not enter the water or wetlands. Generally, work within 30 m of waterways or wetlands requires the oversight of the ESO and the Departmental Representative.
- .3 No stripping shall occur outside of the designated area or within 1 m of the drip line of existing forest.
- .4 Stripped soil materials (including fine forest litter) shall be placed and stored at locations with the project limits or as instructed by the Departmental Representative, for later reclamation use on graded slopes. Stripping piles may require erosion control, sedimentation protection, or stabilization, depending on the location and anticipated duration of storage. At the Departmental Representative's direction, the Contractor shall prepare a plan for managing each stripping pile.

### **3.3 CULVERT INSTALLATION**

- .1 All culverts shall be installed using best management practices for working in or near water that will result in a minimum amount of sedimentation and damage to the riparian area of the watercourse. The Contractor shall prepare a plan for the installation of each culvert a minimum one (1) week prior to doing the work for approval by the Departmental Representative and ESO.
- .2 The culverts shall be installed using best management practices for placement, including consideration of aquatic ecology.
- .3 Culvert should be installed during periods of low discharge (e.g., during the fall). Sediment control measures may be necessary to ensure that excessive amounts of sediments do not enter water courses.
- .4 It may be necessary to exclude fish from the immediate construction site during culvert installation. If so, fish shall be salvaged from within the exclusion area, and construction should be carried out expediently to minimize the time spent working in the drainage.

### **3.4 SPECIFIC CONCERNS RELATIVE TO BLASTING AND SCALING**

- .1 Prior to blasting and periodically during scaling, the Contractor shall sweep the work area and maintain a continuous watch for wildlife that may be present. If wildlife are present, work shall be halted until the wildlife have passed through the area or have been hazed out of the area by the ESO or a Park Warden.
- .2 Steps shall be taken to minimize fly rock and dust. Vegetation outside the designated area shall not be damaged or destroyed.
- .3 Ditches shall be formed and cleaned upon completion of the work and the natural drainage shall be restored as specified or as directed by the Departmental Representative.

- .4 The Contractor shall describe the proposed type and quantities of explosives to be used to the satisfaction of the Departmental Representative and ESO. Blasting products that may produce high residual nitrogen concentrations (such as ANFO) will not be permitted.

### **3.5 SPECIFIC CONCERNS RELATED TO EXCAVATING AND PLACEMENT**

- .1 Materials shall be placed at storage sites or on the grade without spillage outside the working limits. Any material inadvertently falling outside the work limits is to be removed promptly in a manner that does not damage trees or vegetation at that location. The Contractor shall instruct workers to prevent pushing, placement, raveling, storage, or stockpiling of any materials (e.g., slash, rock, fill, topsoil) in the trees bordering the right-of-way or into watercourses or water bodies.
- .2 All sediment control measures shall be implemented by the Contractor prior to the commencement of the work near water bodies, watercourses, and wetlands.
- .3 Special precautions must be taken during excavation near intermittent or active drainage channels.
- .4 Fisheries protection windows shall be observed for any watercourse in this contract and will guide the timing of the work so that stream disturbance is prevented.
- .5 If a pump-out sump to dewater excavation sites is required, the Contractor shall prepare an additional clause to the EPP detailing how the dewatering shall be undertaken, to the satisfaction of the Departmental Representative and the ESO. Special attention shall be given to the environmental sensitivity of the discharge area, freezing conditions operation, overflow avoidance, decanting, and settlement pond reclamation. Water containing suspended materials shall not be pumped into watercourses, into drainage systems, or on to land, except with approval from the Departmental Representative and the ESO.

### **3.6 SPECIFIC CONCERNS RELATED TO EROSION CONTROL AND SEDIMENTATION**

- .1 The EPP shall include an Erosion and Sedimentation Management Plan for the components of this contract undertaken near watercourses, wetlands, or riparian environments. This plan shall be to the satisfaction of the Departmental Representative and ESO. Sediment ponds, if required, shall be designed to settle all sediment particles 0.02 mm or larger. The ponds shall also be designed to handle 1:5 year storm events, with overflow spill capacity for 1:10 year storm events and emergency spillway capacity for 1:100 year storm events.
- .2 Sediments shall not be released into watercourses of sediments in levels that are deleterious to fish or that would harmfully alter, disrupt, or destroy fish habitat. Similarly, sediment shall not be released into areas of vegetation growth or other sensitive areas in levels that would adversely alter growing or hydraulic conditions. The target is 0 mg/L of Total Suspended Solids (TSS) over background levels. The threshold is a maximum instantaneous increase of 25 mg/L over background levels when background levels are <250 mg/L, or a maximum instantaneous increase of 10% over background levels when background levels are >250 mg/L. This threshold shall not be exceeded.

### **3.7 REPLANTING**

- .1 Trees and shrubs shall be replanted with native species approved by PCA and the ESO.
- .2 Trees and shrubs shall be planted at a time and with spacing appropriate for the species. Trees and shrubs are typically best planted in late summer to early fall to allow sufficient time for roots to establish before winter.

- .3 Appropriate growing substrate must be provided for the tree and shrub species, and a 75 mm layer of mulch should be placed over the root zone to conserve moisture and deter weeds.

### **3.8 FINE GRADING, TOPSOIL PLACEMENT, AND SEEDING**

- .1 This contract involves final shaping of cut slopes, fills, and landscapes disturbed in the construction of the Work. These slopes will be covered by stripped soil and chip compost materials and seeded. Environmental concerns related to these activities largely focus on erosion prevention and sediment control. The Contractor is to present a plan for placement, spreading, and stabilization of reclamation materials that controls erosion and prevents sedimentation, to the satisfaction of the Departmental Representative and ESO. Topsoil placement, grading and seeding shall be in accordance with Section 32 92 19 – Seeding and Section 32 91 19 – Topsoil Placement and Grading.

### **3.9 SPECIFIC CONCERNS RELATED TO PROJECT WORK SITE(S)**

- .1 The Contractor is advised that the Kicking Horse River is situated adjacent to Highway 1 along certain slopes. Manholes and storm water catch basins may drain directly to the river in some areas. The EPP for this project shall provide details of the methods the Contractor shall employ to prevent sediment from entering the Kicking Horse River.
- .2 CP Rail infrastructure exists at various locations along the route. The contract drawings should be used as a reference to ensure that peak ground velocities shall not exceed the limits as shown in Section 31 23 21 – Rock Blasting and in the Construction Drawings.

**END OF SECTION**

## SECTION 01 74 23 CLEANING

### PART 1 GENERAL

#### 1.1 SCOPE AND INTENT

- .1 This section includes requirements for progressive cleaning and final cleaning for the duration of the Work.

#### 1.2 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

#### 1.3 RELATED SECTIONS

- .1 Section 01 57 19 - Environmental Procedures.
- .2 Section 01 77 00 - Closeout Procedures.
- .3 Section 31 22 13 – Rough Grading

#### 1.4 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by the Owner, the Public, or other Contractors.
- .2 Roadways and sidewalks in work areas shall be thoroughly cleaned to remove all loose soil and rock material at the end of each work day.
- .3 If road surfacing material is used to pad the roads for protection, the surfacing shall be treated to prevent dust when traffic is flowing.
- .4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .5 Clear snow and ice from access to work areas during active construction periods and to maintain access to environmental protection facilities outside active construction times.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Provide on-site bearproof containers for collecting waste materials and debris.
- .8 Remove waste material and debris from site at the end of each working day.
- .9 Dispose of waste materials and debris off site.
- .10 Store volatile waste in covered metal containers, and remove from the premises at the end of each work day.
- .11 Provide adequate ventilation during use of volatile or noxious substances.
- .12 Use only cleaning materials recommended by the manufacturer of the surface to be cleaned, and use as instructed by the cleaning material manufacturer.

**1.5 FINAL CLEANING**

- .1 When Work is considered Substantially Complete, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Prior to Final Review, remove surplus products, tools, construction machinery, and equipment.
- .3 Remove waste products and debris including that caused by PCA or other Contractors.
- .4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .6 Inspect finishes, and ensure specified workmanship and operation.
- .7 Remove dirt and other debris from exterior surfaces.
- .8 Sweep and wash paved areas until clean.
- .9 Clean drainage systems.

**PART 2 PRODUCTS**

**2.1 NOT USED**

- .1 Not Used.

**PART 3 EXECUTION**

**3.1 NOT USED**

- .1 Not Used.

**PART 4 MEASUREMENT**

- .1 Cleaning is considered incidental to the Contract and will not be measured for payment

**END OF SECTION**

## SECTION 01 77 00 CLOSEOUT PROCEDURES

### PART 1 GENERAL

#### 1.1 SCOPE AND INTENT

- .1 This section includes requirements for closeout of the project including the Contractor's Inspection, the Departmental Representative's Inspection, and Final Inspection.

#### 1.2 RELATED SECTIONS

- .1 Section 01 74 23 – Cleaning.
- .2 Section 01 31 00 – Project Management and Coordination.
- .3 Section 01 78 00 – Closeout Submittals.

#### 1.3 MEASUREMENT PROCEDURES

- .1 This work shall be incidental to the contract and will not be measured for payment.

#### 1.4 INSPECTION AND DECLARATION

- .1 Contractor's Inspection: The Contractor and all subcontractors shall conduct an inspection of the Work, identify deficiencies and defects, and repair as required to conform to the Contract Documents. Once the Contractor's Inspection is complete:
  - a. Notify the Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
  - b. Request the Departmental Representative's Inspection.
- .2 Departmental Representative's Inspection: The Departmental Representative and Contractor will perform an inspection of the Work to identify obvious defects or deficiencies. Contractor shall correct the Work accordingly.
- .3 Completion: The Contractor shall submit a written certificate that the following have been performed:
  - a. Work has been completed and inspected for compliance with Contract Documents.
  - b. Defects have been corrected and deficiencies have been completed.
  - c. Work is complete and ready for Final Inspection.
- .4 Final Inspection: When items noted above are completed, the Contractor shall request a Final Inspection of the Work by the Departmental Representative and the Contractor. If the Work is deemed incomplete by the Departmental Representative, the Contractor shall complete outstanding items and request re-inspection.

**PART 2 PRODUCTS**

**2.1 NOT USED**

.1 Not Used.

**PART 3 EXECUTION**

**3.1 NOT USED**

.1 Not Used.

**END OF SECTION**



## SECTION 01 78 00 CLOSEOUT SUBMITTALS

### PART 1 GENERAL

#### 1.1 SCOPE AND INTENT

- .1 This section includes the requirements for closeout submittals including record drawings and documents, recording site conditions, final survey, and warranties and bonds.

#### 1.2 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 77 00 – Closeout Procedures.

#### 1.3 MEASUREMENT PROCEDURES

- .1 All survey work shall be incidental to contract price proposal and will not be measured for payment.
- .2 Closeout submittals are required prior to issuance of the certificate of completion and final payment

#### 1.4 RECORD DRAWINGS AND DOCUMENTS

- .1 Submit the following Record Documents:
  - a. At the completion of the work, complete an as-built survey of the works including all areas disturbed and modified during construction.
  - b. Marked up shop drawings, product data, and samples.
  - c. Field test records.
  - d. Inspection certificates.
  - e. Manufacturer's certificates.
  - f. QC records.
- .2 Store record documents and samples in field office apart from documents used for construction.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in legible, large, printed letters.
- .4 Maintain record documents in clean, dry, and legible condition. Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

#### 1.5 RECORDING ACTUAL SITE CONDITIONS

- .1 Record information on set of black line opaque Drawings and in copy of the Project Manual.
- .2 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .3 Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction, including:

- a. Field changes of dimension and detail.
  - b. Changes made by change orders.
  - c. Details not on original Contract Drawings.
  - d. References to related shop drawings and modifications.
- .4 Specifications: Legibly mark each item to record actual construction, including:
- a. Changes made by Addenda and change orders.

## **1.6 FINAL SURVEY**

- .1 Submit final site survey certificate certifying that elevations and locations of completed Work are in conformance, or non-conformance, with Contract Documents. The survey shall be in xyz format. Survey file shall include point number, coordinates, and point description.
- .2 As built survey shall include sufficient point density to adequately characterize the work completed. Legibly mark each item on the Issued for Construction drawings and Shop Drawings in red ink to record actual construction conditions and any changes made by addenda and change orders. Record information concurrently with construction progress on the Issued for Construction drawings.
- .3 Final survey

## **PART 2 PRODUCTS**

### **2.1 NOT USED**

- .1 Not Used.

## **PART 3 EXECUTION**

### **3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## SECTION 31 22 13 ROUGH GRADING

### Part 1 GENERAL

#### 1.1 SCOPE AND INTENT

- .1 This section contains the requirements for placement, excavation and grading of material as shown on the contract drawings.

#### 1.2 RELATED REQUIREMENTS

- .1 Section 01 55 26 – Traffic Management.
- .2 Section 31 23 20 – Rock Scaling.
- .3 Section 31 23 21 – Rock Blasting.
- .4 Section 31 23 22 - Common Excavation.
- .5 Section 01 57 19 – Environmental Procedures.

### Part 2 PRODUCTS

#### 2.1 MATERIALS

- .1 Fill material: *Bulk Fill* in accordance with of Section 31 23 22 – Common Excavation.
- .2 Excavated or graded material existing on site suitable to use as fill for grading work if approved by Departmental Representative.

### Part 3 EXECUTION

#### 3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for rough grading 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.

#### 3.2 GRADING

- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .2 Grade ditches to depth as indicated on Contract Drawings.

#### 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.

**END OF SECTION**

## SECTION 31 23 00 STOCK PILE STORAGE

### PART 1 GENERAL

#### 1.1 SCOPE AND INTENT

- .1 This section includes requirements for stock piling material for the Work including material segregation, preparation and erosion control, and decommissioning of storage sites.
- .2 The use of geotextile may be instructed by the Departmental Representative.

#### 1.2 RELATED SECTIONS

- .1 Section 01 14 00 – Work Restrictions.
- .2 Section 31 11 00 – Clearing and Grubbing.
- .3 Section 01 33 00 – Submittal Procedures.
- .4 Section 01 57 19 – Environmental Procedures.
- .5 Section 01 74 23 – Cleaning.
- .6 Section 31 22 13 – Rough Grading

#### 1.3 MEASUREMENT PROCEDURES

- .1 This work shall be incidental to contract price proposal and will not be measured for payment.
- .2 Geotextile, where instructed by the Departmental Representative, will be measured per square metre successfully laid.

#### 1.4 DEFINITIONS

- .1 Organics: Vegetation that has been removed during clearing and grubbing as detailed in Section 31 11 00 – Clearing and Grubbing.
- .2 Topsoil: The uppermost layer of soil that:
  - a. Contains the majority of plant roots.
  - b. Is normally referred to as the plough layer in agriculture soils.
  - c. Is typically darker in colour than the subsoil layer.
- .3 Bulk Fill: Inorganic soils and rock with a diameter less than 200 mm.
- .4 Rock Fill: Rock between 200 mm and 500 mm diameter or rock of larger diameter that does not meet the rip-rap criteria.
- .5 Rip-Rap: Hard rock with relative density not less than 2.65, free from seams, cracks, or other defects. The average angular dimension shall be greater than 500 mm and have a length to width ratio of less than 3.

## **1.5 STORAGE SITE LOCATIONS**

- .1 Two (2) storage sites have designated for use in this program. Their locations and capacities can be seen in the Contract Drawings and include:
  - a. AB/BC Border (~km 82).
  - b. Mount Vaux (~km 119.5).

## **1.6 MATERIAL SEGREGATION**

- .1 Stock piled organics and topsoil shall be segregated and stored independently of other materials.
- .2 Where practical, rock fill shall be separated from bulk fill material.
- .3 Maintain a minimum separation of 3 m between stock piles of different materials.
- .4 Do not stock pile rip-rap or rip-rap bedding in areas where contamination with the underlying soils can occur.
- .5 Stock pile rip-rap and rip-rap bedding in a manner that minimizes segregation.

## **1.7 PREPARATION AND EROSION CONTROL**

- .1 Construct stock piles only in areas designated by the Departmental Representative.
- .2 Obtain Departmental Representative approval for stock piling of any materials. At each of the storage sites, work with the Departmental Representative to undertake a test pit program to determine the suitability of the substrate prior to material storage.
- .3 Before being used for stock pile storage, the locations shall be cleared of all organics and topsoil. Prepare stock pile areas by grading the area level, and diverting drainage from adjacent areas away from the stock pile locations and away from all watercourses.
- .4 Stock piles shall be stored at locations within the project limits or as instructed by the Departmental Representative for later reclamation. Stock piles may require erosion control, sedimentation protection, or stabilization, depending on the location and anticipated duration of storage. At the Departmental Representative's direction, the Contractor shall prepare a management plan for each stripping pile.
- .5 Stock pile slopes, outline, boundaries and general segregation shall be as per the Construction drawings.
- .6 Stock pile storage locations shall comply with Section 01 57 19 – Environmental Procedures.
- .7 Silt fences for temporary stock pile storage (less than one month) and berms for long term storage (greater than one month) shall be used to prevent run off from organics, topsoil, and bulk fill storage locations.

## **1.8 MATERIALS**

- .1 Geotextile shall be non-woven, needle punched, composed of a minimum 85%polypropylene or polyester polymers, formulated to resist deterioration by ultraviolet exposure and free of manufacturing defects, cuts, tears, or any other physical damage, that meets or exceeds the following physical properties.

Property	Requirement	Test Method
1. Thickness	3 to 4.5 mm	
2. Puncture	800 N	ASTM D4833
3. Grab Strength	1,200 N	ASTM D4632
4. Grab Tensile Elongation	50%	ASTM D4632
5. Trapezoidal Tear Strength	500 N	ASTM D4533
6. Mullen Burst Strength	3,500 to 4,500 kPa	ASTM D3786
7. Apparent Opening Size	150 µm	ASTM D4751
8. Permittivity	0.7 sec <sup>-1</sup>	ASTM D4491
9. Flow Rate	40 L/s/m <sup>2</sup>	ASTM D4491

- .2 Rolls shall be 4 m wide and 50 m long unless otherwise approved by the Departmental Representative.

## 1.9 DECOMMISSIONING OF STORAGE SITES

- .1 Not used.

**END OF SECTION**

## SECTION 31 23 20 ROCK SCALING

### PART 1 GENERAL

#### 1.1 SCOPE AND INTENT

- .1 This section provides requirements for scaling of rock faces for the Work, including submittals and execution.

#### 1.1 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

#### 1.2 RELATED SECTIONS

- .1 Section 01 55 26 – Traffic Management.
- .2 Section 31 23 21 – Rock Blasting.
- .3 Section 00 73 19 – Health and Safety Requirements.

#### 1.3 DEFINITIONS

- .1 Scaling: Removing loose soil, rock, and overburden from up to 5 m behind the crest of the slope, the slope face, and benches on the slope. Scaling also includes felling and removing trees and brush, and pulling down larger rocks with wire rope attached to equipment on the highway.
- .2 Hand Scaling: Scaling done by hand working from a fall restraint or work positioning system and using suitable hand tools and powered equipment.
- .3 Mechanical Scaling: Removing loose soil, rock, trees and bushes, on, above, or below the slope using mechanical means, typically an excavator with toothed bucket, ripping tooth, hydraulic breaker, or rack system.

#### 1.4 MEASUREMENT PROCEDURES

- .1 Scaling will be measured as the hours spent by each **individual** scaler actively working on the slope, beginning at the top of rope decent to the scaling area, and ending at the time the scaler reaches the bottom of that particular rope decent, **including standby for passing traffic**. Time spent accessing scaling areas, maintaining equipment, or carrying out work using tools or methods that are not best suited to a particular situation will not be measured for payment.
- .2 Payment for Scaling will be made at the Contract Unit Price per hour for Scaling, which shall be full compensation for supplying all material, labour, and equipment to execute the Work as specified, including timber and brush disposal, and other overhead costs.
- .3 Disposal and cleanup of materials from rock scaling, trimming, and excavation of existing fallen materials in ditches in the work areas will be paid separately under the Excavation bid item.

- .4 Protection of infrastructure shall be considered incidental to scaling and all other unit price work items. Cleanup and removal of scaled material from the roadway and adjacent areas is incidental to Scaling.
- .5 Repair or replacement of all infrastructure damaged by scaling operations, to the satisfaction of the Departmental Representative, shall be at the Contractor's expense.

## **PART 2 PRODUCTS**

### **2.1 NOT USED**

- .1 Not Used

## **PART 3 EXECUTION**

### **3.1 SUBMITTALS**

- .1 Pre-Construction Condition Survey: The Contractor shall submit to the Departmental Representative, not less than one day before the commencement of Work at each work area, a Pre-Construction Condition Survey of all infrastructure in the work area that may be subject to damage as a result of the work. The format of the survey shall be acceptable to the Departmental Representative and to the Contractor's insurance company. If the survey has been completed for other Work Items, then this requirement shall be considered complete.
- .2 Contractor Experience and Qualifications: The scaling crew shall consists of a supervising scaling foreman with at least eight (8) years' experience with an average (mean) of at least four (4) years' experience in each scaling and working from ropes at heights. The scaling crew shall not have more than one (1) scaler with less than one (1) year's experience at any time. A minimum of twenty (20) days prior to mobilizing to site, the Contractor shall provide a Statement of Qualifications to the Departmental Representative including:
  - a. Experience and duties of all personnel assigned to Scaling activities.
  - b. A summary of previous project experience including the project name, location, duration, and the owner/client name and contact information.
- .3 A minimum of twenty (20) days prior to mobilizing to site, the Contractor shall provide the Departmental Representative with a Work Plan/Procedure that details measures the Contractor shall implement to protect any existing utilities and infrastructure that may be impacted by Scaling or other construction activities.

### **3.2 REQUIREMENTS**

- .1 Where Scaling activities may affect existing infrastructure, the Contractor shall provide protective measures as detailed in the Contractor's Work Plan/Procedure, prior to commencing scaling. Protective measures shall include, but not be limited to, padding material placed on the roadway, blasting mats, temporary rock berms or barriers, and temporary removal of signs, guardrails, and similar infrastructure. The Contractor shall be completely responsible for all damage resulting from its Scaling or other operations.
- .2 The Contractor shall have scaling bars, mattocks/pulaskis, shovels, hydraulic jacks or wedge jacks, compressed air "blow pipes", air bags, chainsaws, wire rope for pulling down large rock using a front end loader, and other hand tools and equipment available



on site such that Scaling can be carried out using the most appropriate and effective tools and methods for any given situation.

- .3 The Contractor shall supply a front-end wheel loader (CAT 966 or equivalent) equipped with a flat blade for removal of rock and debris from the pavement surface.
- .4 The scaling foreman and at least one other scaler on the slope shall have a two-way radio for communication with supervisory/traffic control personnel at the highway grade.

### **3.3 GENERAL EXECUTION**

- .1 For each slope section, scale areas shown on the photographs and as directed by the Departmental Representative.
- .2 Trees and brush shall only be removed as directed and approved by the Departmental Representative or Environmental Surveillance Officer.
- .3 Scaling shall be carried out using the most appropriate and effective tools and methods for any given situation as approved by the Departmental Representative.
- .4 Any construction access on the slope including but not limited to trail building, installing access ropes, ladders, and tree and brush removal to facilitate access to the designated scaling areas shall be considered incidental to the Work. Any temporary construction access shall be removed upon completion of the Work.
- .5 All rope work shall comply with best practices detailed in applicable WorkSafe BC regulations including Part 34 of the OHS Regulation.

**END OF SECTION**

## SECTION 31 23 21 ROCK BLASTING

### PART 1 GENERAL

#### 1.3 SCOPE AND INTENT

- .1 This specification describes the limitations and desired results of controlled blasting techniques to produce natural-looking rock cuts for the Yoho National Park Slope Reprofilng project.
- .2 Blasting shall be conducted in a manner that minimizes damage to the backslope and minimizes the need for additional remedial work.
- .3 Structural support, remedial work, half barrels, or blast hole traces shall not be visible on the final rock face (except as detailed herein).

#### 1.2 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

#### 1.3 RELATED SECTIONS

- .1 Section 01 57 19 - Environmental Procedures.
- .2 Section 31 23 20 – Rock Scaling.
- .3 Section 01 55 26 – Traffic Management.
- .4 Section 01 74 23 – Cleaning.
- .5 Section 31 72 13 – Anchoring.

#### 1.4 DEFINITIONS

- .1 Blasting Consultant: A consultant with expertise in blasting and non-explosive rock excavation who is independent of the Contractor and retained by the Contractor to provide blasting design and quality control functions as specified herein.
- .2 Blaster: A licensed blaster with WorkSafeBC who holds a current urban blasting endorsement.
- .3 Controlled Blasting: The use of blasting methods designed to prevent rock damage or overbreak beyond the Limits of Excavation, provide adequate fragmentation, and prevent damage to infrastructure from vibrations, fly rock, or falling rock. Unless otherwise authorized by the Departmental Representative, Controlled Blasting requires that:
  - a. Blast holes shall not exceed 8 m depth.
  - b. “Buffer Blasting” shall be used with appropriate delays between successive rows of blast holes where there are more than two rows of holes.
  - c. Preshear blasting should be anticipated.
- .4 Bulk Blasting: The removal of large volumes of rock from a cut slope. Drilling is typically

undertaken using a track-mounted drill rig.

- .5 Trim Blasting (Trimming): Usually instructed on a case by case basis and comprises the removal of potentially unstable rock material from the face of a rock slope that is too large to be removed by scaling using controlled blasting techniques. Drilling is often completed using plugger drills with operators suspended on ropes.
- .6 Backline Holes: The line of holes drilled along the backslope of the limit of excavation.
- .7 Production Holes: Holes within the limit of excavation that are not backline holes.
- .8 Cushion Blasting: A blasting method where holes drilled along the final excavation backslope (i.e., backline holes) are detonated after production holes have been detonated.
- .9 Pre-Shear Blasting (or Presplitting): A blasting method where holes drilled along the final excavation backslope are detonated in advance of the production holes to create a fracture line along the limits of excavation.
- .10 Buffer Blasting: A line of holes located nearby and parallel to the backline holes to prevent damage beyond the limits of excavation.
- .11 Fly Rock: Fragmented material (typically fragments of rock) that is thrown during blasting.
- .12 Vibration Monitoring: The use of a seismograph to record blast induced ground movements.
- .13 Stemming: Inert material placed in a drill hole on top of the explosives to contain the explosive gases.
- .14 Limits of Excavation: Surfaces forming the required extent of excavation (i.e., the extents within which rock will be removed) shown on photographs/drawings or as directed by the Departmental Representative.
- .15 "Half-Barrels": Remnants of a borehole left on the final face.
- .16 Half Barrel Area: Area on the final face where one or more half barrels exceed 4 m<sup>2</sup> as measured from the outside limits of each borehole to adjacent boreholes. Half barrels within 5 m of another half barrel area shall be not considered part of the same Half Barrel Area.
- .17 Design Line: The final surface of the rock face as shown on the Design Drawings.
- .18 Underbreak: Material remaining on the final face that causes the excavation not to reach the Limits of Excavation.
- .19 Overbreak: Additional excavation beyond the Limits of Excavation.

## **PART 2 PRODUCTS**

### **2.1 EXPLOSIVES AND ACCESSORIES**

- .1 All explosives and associated material used for blasting operations will be produced by a recognized manufacturer.

- .2 Explosives past the manufacturer's expiry date shall not be used.
- .3 Bulk ammonium nitrate and fuel oil (ANFO) type explosives shall not be used.
- .4 Where there is a danger of initiation system cut-offs, detonators and delay elements must be of a type that includes down-hole delays (e.g., Handidet) to prevent cut-offs.
- .5 Detonation cord over 20 Grain shall not be used without prior written consent from the Departmental Representative. 400 Grain Detonation Cord may be used in pre-shear holes.

### **PART 3 SUBMITTALS**

#### **3.1 GENERAL**

- .1 Blasting submittals are for quality assurance and record keeping purposes. Review of the Proposed Blast Designs by the Departmental Representative shall not relieve the Contractor of responsibility for the accuracy and adequacy of the implemented designs. Submittals that are inadequate will be returned to the Contractor for revision and re-submittal prior to acceptance.

#### **3.2 PRE-BLASTING SUBMITTALS**

- .1 General Blasting Work Plan: Within five (5) days following Contract award, the Contractor shall provide a General Work Plan for the blasting operations which outlines the proposed types of explosives, delays and detonators, drilling methods, practices for executing blasting, final wall control, and practices for handling and storing explosives.
- .2 Contractor Experience and Qualifications: Within five (5) days following Contract award, the Contractor shall provide a statement of the qualifications to the Departmental Representative including:
  - a. Experience and duties of all personnel assigned to drilling and blasting activities.
  - b. A summary of previous project experience including the project name, location, volume of rock, year constructed, and the owner/client name and contact information.
  - c. The company, the driller, and the blaster shall each have a minimum of five (5) years' experience in drilling and controlled blasting. Work experience should include at least three (3) projects involving rock cuts over 8 m height, and at least one (1) of the aforementioned three shall be along transportation corridors. The blaster shall be licensed with WorkSafeBC and have an urban blasting endorsement.
- .3 Blasting Consultant Experience and Qualifications: The Blasting Consultant shall have a minimum of five (5) consecutive years demonstrated experience in preparing successful blast designs along transportation corridors for at least three (3) projects. Within five (5) days following Contract award, the Contractor shall provide the following information on the Blasting Consultant to the Departmental Representative:
  - a. A list of at least three (3) projects (including project name, location, and description) demonstrating experience in preparing successful blast design.
  - b. Name and phone number of owner/client contact who can verify the experience of the Blasting Consultant's site representative.

- c. Qualifications of the Blasting Consultant's on-site representative who will be providing the quality control for rock excavation.
- .4 Proposed Blast Designs: Not less than one (1) week prior to commencing work, The Contractor shall submit to the Departmental Representative for review and acceptance Proposed Generic Blast Design(s) for the Project.
  - a. Methodology for blasting and back wall control.
  - b. Plan and cross-section sketch drawings of proposed blast showing the free face, drill pattern (burden and spacing), dimensions, estimated volume, calculations for maximum charge weight per delay, and vibration prediction at the given structure (where appropriate).
  - c. Diameter, inclination, orientation, depth, and number and type of drilled holes.
  - d. Loading diagram showing type and amount of high explosive or non-explosive products, initiators, and depth of stemming for each type of blast hole.
  - e. Initiation sequence for blast holes including delay pattern and individual hole delay times.
  - f. Manufacturer's data sheets for all explosive and non-explosive products, delays, and initiation systems to be used.
  - g. Make and model of non-explosive rock excavation equipment (e.g., hydraulic splitters, excavator mounted Hydraulic Breaker).
  - h. Methods of protecting existing infrastructure that shall be employed.
  - i. Approval by the Blasting Consultant including their printed name, signature, company name, and blaster certificate number.
  - j. Anticipated powder factor (in kg/m<sup>3</sup>).
- .5 These generic blast designs will be developed during the first few blasts to limit the ongoing submittals. Each day the Departmental Representative will be advised by email which Blast Design(s) shall be used and include, as a minimum, the following information:
  - a. Site kilometre location and Station limits of proposed blasting.
  - b. Anticipated peak particle velocity (PPV) at a monitoring location (if required).
  - c. Anticipated final wall results.
- .6 Pre-Construction Survey: The Contractor shall submit to the Departmental Representative, not less than two (2) days before blasting, a Pre-Construction Condition Survey of all infrastructure in the area that might be subject to damage. The format of the survey shall be acceptable to the Departmental Representative. The pre-construction survey should be undertaken in a manner acceptable to the Contractor's insurance provider.

### 3.3 POST-BLASTING SUBMITTALS

- .1 As-Built Blasting Record: Not more than one (1) working day after completing work at each location, the Contractor shall submit an As-Built Blasting Record to the Departmental Representative. The As-Built Blasting Record shall indicate all deviations from the Proposed Blast Design; state the actual date, time, and duration of blasting; and identify any known or suspected damage, traffic delays, or other problems that may have resulted from blasting. If appropriate, the Proposed Blast Design may be used as the As-Built Record as long as it is signed as such.
- .2 Blasting Consultant Field Report: Within three (3) days following each site visit, the Contractor shall submit a Field Report prepared by the Blasting Consultant. The Field Report shall document observations and recommendations made by the Blasting Consultant and consist of two (2) to four (4) typed pages plus relevant photographs and drawings.
- .3 Vibration and Peak Overpressure Records: The Contractor shall provide vibration and peak overpressure records including monitoring results and interpretation following each blast, where a prescribed limit has been placed on blast vibrations and/or overpressures. These should be submitted as an appendix to the As-Built Blasting Record report.

## **PART 4 EXECUTION**

### **4.1 QUALITY CONTROL**

- .1 Proposed Blast Designs for all blasting shall be prepared by the licensed Blaster who will directly oversee the blasting, or by the Blasting Consultant.
- .2 The Blasting Consultant shall make an initial Site Visit prior to any blasting to inspect the blasting areas and advise on blasting methods and measures necessary to protect infrastructure and the environment.
- .3 Following the initial site visit, the Blasting Consultant shall visit the work locations on a monthly basis. The Departmental Representative may require the Blasting Consultant to make subsequent Site Visits during the course of the work. For budgetary purposes, the Contractor should assume seven (7) visits to site.
- .4 The Blaster shall directly oversee the drilling, loading, and detonation of all blasts.
- .5 The Contractor shall not commence drilling or other work on a blast until the Blast Design has been submitted to and accepted by the Departmental Representative.
- .6 The Contractor shall advise the Departmental Representative via email by 07:00 hrs every day of the anticipated time of loading for each blast. This will permit the Departmental Representative to measure the length of holes and dimensions of the blast, and perform other quality assurance tasks if required.

### **4.2 TRIAL BLASTING**

- .1 Prior to commencing full-scale blasting operations, the Contractor shall demonstrate the adequacy of the proposed blast design by drilling, blasting, and excavating test sections up to 30 m in length to determine which combination of methods, hole depth, timing, and charge provide acceptable results and Peak Particle Velocity (PPV) levels.
- .2 Unless otherwise approved by the Departmental Representative, all requirements for full-scale blasting will also apply to trial sections.
- .3 The requirement of shearing the final wall may be deleted from the program if the

Contractor can effectively demonstrate and maintain minimal damage beyond the final wall at the discretion of the Departmental Representative.

#### **4.1 GENERAL REQUIREMENTS**

- .1 The Contractor shall provide suitable equipment to remove all drill hole traces in blasted areas.
- .2 All blasting shall be in accordance with the requirements provided in Section 01 57 19 – Environmental Procedures.
- .3 The Contractor should expect and be prepared for wet hole conditions and have the appropriate explosives or procedures available.
- .4 The Contractor shall provide a front-end wheel loader (CAT 966 or equivalent) equipped with a flat blade for removal of rock and debris from the pavement surface.
- .5 The Contractor shall provide labour, equipment, blasting mats, and all other supplies necessary to control fly rock and protect existing infrastructure during the work.
- .6 The contractor shall obtain all necessary permits from and shall comply fully with the laws, rules, and regulations of Municipal, Provincial, and Federal agencies in connection with the use, transport, storage, and safe handling of all explosives. The contractor shall be familiar with the Industrial Health and Safety regulations published by the Worker's Compensation Board of the Province in which the site is located.
- .7 Explosives and all detonating apparatus shall be stored in a magazine in accordance with the requirements of all Federal or Provincial inspectors having jurisdiction, and the requirements of the Explosives Act (Canada), R.S. 1985, as amended, and any applicable Municipal By-laws.
- .8 Blasting shall only be conducted after the Engineer has received the Certificates of Insurance required by the Contract Documents. The Certificates shall verify that the Blaster's General Liability and Property Damage Coverage contain no specific exclusions for Work related to Blasting.
- .9 The Blaster shall bear full responsibility for ensuring that all Blasting Operations are conducted in a satisfactory manner and in accordance with these specifications. The Departmental Representative's review of the Blasting Plan shall in no way relieve the Blaster from this obligation, nor shall the Departmental Representative assume any responsibility for the adequacy of the Blasting to achieve adequate breakage or acceptable results.
- .10 As required, ditches shall be formed and cleaned upon the completion of the Work and the drainage shall be restored/alterd as specified or as directed by the Departmental Representative. Unless otherwise specified, areas where rock was excavated should be free draining. If craters are formed during blasting, the Contractor shall provide drainage by trenching to a suitable outlet.
- .11 The Contractor shall use appropriate methods to minimize breaking, loosening, or damaging rock outside the Limits of Excavation.
- .12 Blast induced vibrations shall not exceed 50 mm/s when measured at any CP Rail Track, including historic infrastructure.
- .13 Where possible, contamination of excavated rock with organic material shall be



minimized.

- .14 At locations identified on the Construction Drawings (or near CP Rail infrastructure), the Contractor shall develop a site-specific Scaled Distance plot to improve confidence in PPV prediction, and this shall be refined after each monitored blast. In lieu of this
- .15 Explosives shall be stored outside Yoho National Park. Magazine set up and storage shall comply with all NR-Can regulations. The cost of setting up and maintenance of the magazine shall be incidental to the project.
- .16 Fuse blasting shall not be used as a blast initiation mechanism.
- .17 Limits of Excavation shall be within 0.25 m of the Design Line. Over excavation beyond this line shall not be measured for rock excavation. However, excess material beyond 1 m of the final face shall be measured for Common Excavation volumes. Excavation beyond 1 m of the final face shall be transported to the storage sites at the Contractor's cost.

### **3.5 BLAST EXECUTION**

- .1 Blasting shall be performed prior to other specified work, such as scaling or anchoring, where this work may be adversely affected by blasting.
- .2 Blasting shall use explosives unless otherwise approved by the Departmental Representative.
- .3 For development of a pioneer access bench across the crest of the cut, the holes may be drilled sub-horizontally, advance rounds should be limited to not more than 5 m.
- .4 Supply, place, and remove protective measures for roadways and all other infrastructure that might be damaged by blasting. Protective measures shall include, but not be limited to, granular padding material to protect roadways, timbers or blasting mats to prevent fly rock or protect structures, and temporary removal of infrastructure at risk. The Contractor shall repair or replace any and all damage caused by blasting at its own cost.
- .5 Blasting shall be scheduled and coordinated with all stakeholders including, but not limited to, PCA, the Departmental Representative, utilities, paving contractors, and local businesses in compliance with traffic control and blasting related provisions of the specifications.
- .6 Following blasting, the slope shall be thoroughly mechanically scaled to provide a sound rock surface in the blast area and to remove all loose rock and debris caused by blasting.

### **1.4 MEASUREMENT PROCEDURES**

- .1 Blasting (Bulk Blasting and Trim Blasting) will be measured as the in situ "bank" volume of rock excavated, based on survey measurements taken by the Contractor and confirmed monthly by the Departmental Representative. Prior to any excavation work the Contractor shall supply a survey (printed drawings and digital terrain model in X,Y,Z point file) of each rock face for review.
- .2 Over-excavation and over-break beyond the Limits of Excavation, and secondary breaking of oversize material resulting from blasting will not be measured for payment. The tendered unit prices shall be full compensation for supplying all material, labour, and equipment to execute the work as specified.



- .3 Final wall control pre-shearing, shall be paid per square metre of successfully sheared rock.
- .4 Payment for Trim Blasting will be made at the Contract Unit Price per cubic metre of rock blasted. The tendered unit price shall be full compensation for supplying all material, labour, and equipment to execute the work as specified.
- .5 Payment for Blasting will not be made until all related submittals have been received and approved by the Departmental Representative.
- .6 Each Blasting Consultant Site visit of minimum 8 hours duration on site will be measured as one (1) Site Visit. Payment for each Site Visit will be made at the Contract Unit Price, which shall include all hourly and disbursement costs associated with travel, costs incurred on site, reporting, and administration. **The Blasting Consultant is required to attend the kick-off meeting at the start of the project.** The Blast Consultant is required on site at the discretion of the Departmental Representative. Site Visits requested by and approved in advance by the Departmental Representative will be measured for payment. The Contractor should expect seven (7) site visits.
- .7 Rock Scaling to facilitate access to trim blasting locations and performance of Trimming, and Scaling of the trim area and the slope below the trim area to remove all loose rock produced by blasting shall be incidental to Trimming.
- .8 Preparation of initial submittals and engaging a Blast Consultant to prepare and/or certify Proposed Blasting Plans is considered incidental to Blasting. Subsequent visits requested by the Departmental Representative shall be measured under Clause 1.4.5 above.
- .9 Protection of infrastructure and removal of Blasted material from the roadway and adjacent areas is considered incidental to Blasting.
- .10 If the Contractor fails to follow the Blast Design and the slope remains in an undesirable condition following Blasting, all remedial measures necessitated by improper Blasting as determined by the Departmental Representative shall be at the Contractor's expense.
- .11 The As-Built Blast Report comprises 5% of the total value of the Blast.
- .12 The use of a seismograph and development of a Scaled Distance plot shall be considered incidental to blasting and shall not be measured for payment.
- .13 Magazine monitoring and maintenance shall be considered incidental to the Contract and will not be measured for payment.
- .14 Removal of borehole traces shall be measured on a linear metre basis.
- .15 Removal of drill offset benches shall be measured at the Trimming unit rate.
- .16 Rock excavation for creation of crest preferential drainage pathways or channels will be measured at the Trimming unit rate.
- .17 Rock excavation for cross ditch channeling will be measured at the Trimming unit rate.

### 3.4 ENVIRONMENTAL REQUIREMENTS

- .1 The Contractor shall ensure that all work activities meet or exceed the standards outlined

in Department of Fisheries' and Ocean's (DFO's) "Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters"; Canadian Technical Report of Fisheries and Aquatic Sciences 2107, 1998.

- .2 The Contractor shall comply with all requirements in Section 01 57 19 – Environmental Procedures, and ensure that all work activities comply with environmental requirements outlined by PCA.
- .3 Dispose of waste materials as specified in Section 01 57 19 – Environmental Procedures.
- .4 A pneumatic chipper and/or an excavator-mounted hydraulic rock breaker, or other approved method, shall be used to remove all drill hole traces on the final excavation surfaces(beyond the acceptable limits shown in the Contstruction Drawings) produced by Blasting to the satisfaction of the Departmental Representative.

**END OF SECTION**

## SECTION 31 23 22 COMMON EXCAVATION

### PART 1 GENERAL

#### 1.1 SCOPE AND INTENT

- .1 This Section contains the requirements for haulage of material from each of the work sites to storage sites as shown on the Contract Drawings.

#### 1.2 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

#### 1.3 RELATED SECTIONS

- .1 Section 01 55 26 –Traffic Management.
- .2 Section 31 23 20 – Rock Scaling.
- .3 Section 31 23 21 – Rock Blasting.

#### 1.4 DEFINITIONS

- .1 Common Excavation consists of excavation, hauling, and storage of blasted, scaled, and pre-existing loose rock and soil material from excavation activities and highway ditches and adjacent slope areas as shown on the Contract Drawings and as directed by the Departmental Representative.
- .2 Common Excavation material also includes timber, brush, and organic materials.
- .3 Inclement weather: Rainfall greater than 50 mm in 24 hours or fog as defined by the Contractor's Traffic Control Personnel.
- .4 The Contractor shall remove make a concerted effort to create stock piles segregated into the following classes:
  - .a Bulk fill – 0 to 200 mm blast rock and shall be free from organic material
  - .b Rip-rap – Rock >200 mm average angular dimension.
  - .c Organic material – Trees, chipped woody products, brush, and all other flora removed from the work locations.
  - .d Overburden and topsoil.
- .5 Catchment Ditch Rock: Well graded 0 to 200 mm native blast rock shall be left at each final ditch location. It is likely that screening oversize with a skeleton bucket will produce acceptable material. The volume required at each site shall be shown on the Construction drawings.

#### 1.5 MEASUREMENT PROCEDURES

- .1 Each stockpile site shall have a series of test pits dug and logged under instruction by the Departmental Representative. If site preparation is required, the test pits shall be

measured using time and materials as set out in the BC Heavy Road Builders Blue Book Equipment Rental Rate Guide

- .2 The foundation requirements of the stock piles will be determined from the test pit program in Clause 1.5.1.
- .3 Common Excavation will be measured to the nearest cubic metre stored in each of the designated stock piles. A survey shall be undertaken of each storage area prior to stripping. Surveyed volumes shall be submitted for payment as per the payment schedule. The cubic metre rate shall be considered full compensation for loading the trucks, stock pile maintenance, and measurements for payment.
- .4 The Contractor shall submit daily haul volumes to the Departmental Representative
- .5 Overexcavation beyond the limits shown on the Contract Documents or directed by the Departmental Representative will not be measured for payment.
- .6 Traffic Management, grading of stockpiles, clean up of excavation areas, and all costs related to use of the disposal site are considered incidental to Common Excavation.
- .7 The Contractor may propose out of the Park disposal of some of the materials. This shall be reviewed by the Departmental Representative on a case by case basis.

#### **1.6 WASTE MANAGEMENT**

- .1 Separate and recycle waste materials in accordance with Section 01 57 19 – Environmental Procedures.
- .2 Arrange for out of the Park disposal of all other material.

### **PART 2 PRODUCTS**

#### **2.1 NOT USED**

- .1 Not Used.

### **PART 3 EXECUTION**

#### **3.1 SUBMITTALS**

- .1 Common Excavation Haulage and Storage Plan: At least two (2) weeks prior to the start of Common Excavation, the Contractor shall submit details of its proposed haulage plan to the Departmental Representative for review. The plan shall include the name and address of any subcontractors used.
- .2 The Departmental Representative shall be given at least five (5) days' notice prior to commencement of the test pit program.

#### **3.2 REQUIREMENTS**

- .1 The Contractor shall supply all loading, hauling, and site preparation and maintenance equipment for the duration of the Project.
- .2 The haul trucks used on the TCH must be road legal.

### **3.3 EXCAVATION**

- .1 Common Excavation shall be carried out within two (2) weeks of completing stabilization work at each work site unless otherwise authorized by the Departmental Representative.
- .2 Common Excavation areas shall be cleaned and restored to a visually pleasing quality, which includes having final slopes and grades as directed by the Departmental Representative.
- .3 Catch basins and culvert inlets shall be cleaned out and restored.
- .4 Excavated materials hauled to the Contractor's disposal site shall be graded as required by the Contract Drawings.

**END OF SECTION**

## SECTION 31 72 13 ANCHORING

### PART 1 GENERAL

#### 1.1 SCOPE AND INTENT

- .1 This section includes material and installation requirements for anchorages.
- .2 Anchors shall not be visible on the final rock face.

#### 1.1 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

#### 1.2 RELATED SECTIONS

- .1 Section 01 55 26 – Traffic Management.
- .2 Section 31 23 20 – Rock Scaling.
- .3 Section 31 23 21 – Rock Blasting.
- .4 Section 01 57 19 – Environmental Procedures.

#### 1.3 GENERAL

- .1 Anchors consist of the installation of deformed steel bars (tendons) in holes drilled into rock or soil. Anchors shall be fully grouted and either tensioned or untensioned (dowels) as directed by the Departmental Representative.
- .2 Numerous existing anchors have been installed at most of the Work sites. Most of these anchors are camouflaged and not visible without close on-slope inspection.
- .3 The required number, length, location, and orientation of anchors will be determined on site by the Departmental Representative. The Contractor shall be prepared to install any number of anchors ranging up to 9 m in length at any or all of the work sites.
- .4 The Contractor shall maintain on site a Reserve Supply of anchor accessories and grout such that there are no delays for procurement of materials.

#### 1.4 MEASUREMENT PROCEDURES

- .1 Supply of anchorages will be measured for payment as the length in metres of anchor tendons supplied to site and installed. The quantity of anchorages delivered to site shall not exceed the tender amount. If required, additional anchor procurement will be authorized by the Departmental Representative
- .2 Installation of anchors shall include the supply of tendons, bearing plates, nuts, hardened flat washers, beveled washers, centralizers, couplers, grout, recessing of plates, and mortar, as well as the drilling, installation, and testing of the anchors. Installation of anchors will be measured as the length in metres of anchors successfully installed and embedded into the ground. Excessive bar protruding from the rock face shall not be measured.

- .3 Payment for anchorages will be at the Contract Unit Prices for Installation. Payment will not be authorized until all related submittals have been received and approved by the Departmental Representative.
- .4 The Contract Unit Prices for anchors shall be considered full compensation for all anchors requirements in this Specification. Scaling to facilitate access to the designated anchoring areas is considered incidental to the Work.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 The tendons shall be 25 mm diameter, Grade 517/690 MPa deformed steel bars conforming to CAN/CSA G30.18, such as "Dywidag Threadbar" manufactured by Dywidag Canada Limited, or #8 bar supplied by Williams Form or approved equivalent.
- .2 Steel bearing plates shall conform to CAN/CSA-G40.21, Grade 300 W and have minimum dimensions of 10 mm by 150 mm by 150 mm. Plates shall be of "calotte" or similar style material to accommodate non-perpendicular alignment of the anchor with the plate.
- .3 Nuts shall be hexagonal head, heavy duty type, with hemispherical end matching the bearing plate and shall conform to ASTM A325. Threads and nuts shall be capable of developing the full strength of the anchor.
- .4 Anchors and all associated hardware shall be hot-dip galvanized to CSA G164 & CSA G30.18M. Field cut anchor bar shall be touched up with "Galvanox" zinc-rich paint or approved alternate by the Departmental Representative.
- .5 Resin grout or cementitious grout may be used. Resin grout shall not be used where the rock is excessively fractured or wet, as determined by the Departmental Representative.
- .6 Resin Grout shall be the product of an established manufacturer who has been producing these products for at least five (5) years. Resin shall be supplied in cartridge form and have a shelf life of not less than six (6) months, as dated on the container, and be used within the first three (3) months of the shelf life. Cartridges shall be stored in accordance with the manufacturer's recommendations. Resin used for the anchorage length of the bolt shall have a gel set time of one (1) to two (2) minutes. Resin used to encapsulate the remainder of the bolt length shall have a gel time of fifteen (15) to thirty (30) minutes.
- .7 Cement grout shall be a pre-bagged, non-shrink cementitious product such as "Microsil® Anchor Grout" produced by Basalite Concrete Products, or approved equivalent. Cement grout shall have a minimum three (3) day and twenty-eight (28) day compressive strengths of 30 MPa and 50 MPa, respectively, when tested in accordance with CAN/CSA A23.2-1B. Equipment for mixing and pumping grout shall be capable of satisfactorily mixing and agitating the grout, and pumping it into the holes at the water/cement ratio recommended by the grout manufacturer. Grouting shall be tremied from the base of the hole to rock face. Cementaceous grouts and mortar shall not be warmer than 30°C or colder than 5°C during mixing or pumping.
- .8 Cement mortar levelling pads shall be SIKA 212, or approved equivalent, and shall be mixed, placed, and cured in accordance with the manufacturer's recommendations.

## **PART 3 EXECUTION**

### **3.1 SUBMITTALS**

- .1 Anchor Installation Procedure: Prior to ordering anchor materials, the Contractor shall submit an Anchor Installation Procedure for review by the Departmental Representative. The Installation Procedure shall include product information from the anchor hardware and grout manufacturers including their recommended installation procedures, drilling equipment and hole diameter, grouting and tensioning procedures, calibration certificate(s) for anchor testing equipment, and similar information.
- .2 Anchor Installation Records: The Contractor shall submit anchor installation records to the Departmental Representative daily in a format approved by the Departmental Representative. The records shall include, but shall not be limited to, individual anchor reference number, bar length, bar grade/diameter, depth of anchor distal end, proximal extension from face, proximal bar extension behind nut, over-drill depth, grout type, grout temperature, grout volume used, number of spacers used, grout samples taken, lock off load/tension, date/time tested, as-constructed anchor azimuth, dates/time of staged grouting, and date/time completed.
- .3 Driller's Logs: The Contractor shall submit the Driller's Logs to the Departmental Representative within one (1) day after drilling or upon request. The records shall include, but shall not be limited to, details of flush losses/reductions, inferred faults, depth of overburden, hole diameter, rig type, type of flush, water ingress, jamming during drilling, changes in rock type, and other relevant information that may affect the quality of the anchor installation.
- .4 Grout Testing Results: The Contractor shall submit to the Departmental Representative grout testing results, including but not limited to, Compressive Strength Testing within seven (7) days following completion of testing.
- .5 Mill and Galvanizing Certificates: The Contractor shall submit to the Departmental Representative mill and galvanizing certificates for the anchor bar a minimum of one (1) day prior to installation.
- .6 Calibration Certificates: The Contractor shall submit calibration certificates for testing and tensioning equipment within one (1) day of commencing work on site, including but not limited to, hydraulic jacks, gauges, and torque wrenches.

### **3.2 QUALITY CONTROL**

- .1 Drill and install anchors under the direct supervision of an individual having at least four (4) years experience in the installation of resin and cement grouted anchors.
- .2 The first ten (10) anchors shall be installed in the presence of the Departmental Representative. Thereafter, a minimum of 20% of the anchors shall be tested in the presence of the Departmental Representative.
- .3 Hydraulic jacks, gauges, and torque wrenches used for testing and tensioning of anchors shall be calibrated by an independent, certified testing laboratory within one (1) year of use.
- .4 Provide the Departmental Representative with any samples of grouting materials that may be requested for quality assurance testing.



Grout quality control measures shall comprise:

- a. Specific Gravity compliance.
- b. Apparent viscosity with an ASTM Flow Cone or Marsh Cone.
- c. Bleed tests as per CSA A23.2-1B Clause 6.

### 3.3 PROCEDURES

- .1 Drill holes for each anchor to a uniform diameter recommended by the tendon manufacturers. In the case of cement grouted anchors, drill holes to a nominal diameter of 60 mm, or smaller if required to accommodate an expansion shell anchor. Completely clean holes of all drill cuttings, sludge, debris, and water using clean water and air. In the case of resin grout the borehole diameter shall be compatible with the bar and the resin capsules used.
- .2 Anchors shall either be installed with an exposed plate and nut, or with the anchor cut off flush to the rock surface without plate and nut, or with the plate counter sunk into a recess in the rock face as directed by the Departmental Representative.
- .3 If required, Anchors shall be installed with sufficient thread exposed to accept a plate and nut and to facilitate tensioning and testing. Where a plate and nut is not required, anchors shall be cut off flush with the rock surface after tensioning and testing, and be covered with mortar coated with drill cuttings. Wet burlap shall be placed over all mortar to aid curing.
- .4 Cement grouted anchors that are to be tensioned shall use an expansion shell for the bond length anchorage. Use commercially manufactured centralizers at intervals not greater than 2 m to keep the bar centred in the hole. Fill the holes with grout by pumping the grout through a delivery line that extends to the lowest end of the hole, while providing a means of venting at the highest end of the hole. Prior to the grout setting, perform testing and tensioning, and attach the bearing plate and nut (if required).
- .5 Installation – Resin Grouted Ancorages. Insert resin cartridges in the hole. The number of cartridges per hole shall be not less than recommended by the manufacturer for the hole length, diameter, and bar size combination. Add additional cartridges as necessary to ensure holes are completely filled with resin. Use at least three (3) fast setting cartridges at the bottom of the hole for anchorage and slow setting cartridges for the remainder of the hole. Mix the resin by inserting the bolt in the hole and rotating it at a uniform penetration rate, rotation rate and duration as recommended by the resin manufacturer. After allowing the fast setting cartridges to set, but at least 10 minutes prior to the gel time of the slower cartridges, perform testing and tensioning, and attach the bearing plate and nut (if required).
- .6 Remove all excess cement grout from rock surfaces.
- .7 Testing: Testing equipment shall consist of a suitably sized hollow core jack, an adjustable bearing truss for aligning the direction of pull with the centreline of the anchor, an extension bar for attaching the jack to the anchor, a hydraulic pump with a gauge, a calibration chart for the ram/gauge combination that provides the applied load directly in kilonewtons, and an independently mounted dial gauge for measuring the strain of the anchor under load. Anchors for testing will be selected at random by the Departmental Representative. All testing will be undertaken by the Contractor as directed by the Departmental Representative. The Contractor shall supply all necessary equipment and be capable of performing the following testing:

- a. Proof Tests: Prior to grouting the free stressing length of the anchor curing, the bond length of the anchor shall be proof tested by loading the anchor in tension to 184 kN and maintaining the load for five (5) minutes. Anchors will be considered to have failed and shall be replaced if total axial movement exceeds 12 mm or if movement continues to occur at or below the test load.
  - b. Pull Tests: After grout within the free stressing length of the anchor has cured, the anchor shall be pull tested by loading the anchor in tension to 184 kN and maintaining the load for five (5) minutes. Anchors will be considered to have failed and shall be replaced if the total axial movement exceeds 6 mm or if movement continues to occur at or below the test load. Cement grouted anchors shall not be pull tested until at least seven (7) days after grouting.
- .8 The first eight (8) anchors shall be proof tested; thereafter, a minimum of 3% of the anchors shall be proof tested as selected by the Departmental Representative.
  - .9 A minimum of 20% of the anchors shall be pull tested as selected by the Departmental Representative.
  - .10 Additional tests shall be performed as directed by the Departmental Representative where different rock types or anchor installation conditions are encountered as construction progresses.
  - .11 Up to five (5) additional anchors in the vicinity of a failed anchor shall be tested as required by the Departmental Representative.
  - .12 Tensioning: The Departmental Representative will determine the tension load for each anchor. Tensioning equipment shall consist of the hollow core jack. A calibrated impact or torque wrench may be used for light tension loads, subject to approval by the Departmental Representative. Tensioned anchors shall be tensioned before the grout within the free stressing length of the anchor cures. Anchors shall be tensioned and locked-off at tensions ranging from 50 kN to 158 kN as directed by the Departmental Representative.
  - .13 Untensioned anchors with a bond length anchorage shall be nominally tensioned to 25 kN using an approved impact or torque wrench. Where a bearing plate and nut is not required, these shall be removed and the protruding length of anchor cut off after the grout in the free stressing length has cured. Untensioned anchors (cement grouted anchors with a plate and nut) shall be nominally tensioned to 25 kN after the grout in the free stressing length has cured.

**END OF SECTION**

## **SECTION 32 91 19 TOPSOIL PLACEMENT AND GRADING**

### **PART 1 GENERAL**

#### **1.1 SCOPE AND INTENT**

- .1 This section provides requirements for topsoil placement and grading.
- .2 The term topsoil shall be synonymous with redistributed organic material for the temporary access road reinstatement.

#### **1.2 RELATED SECTIONS**

- .1 Section 01 57 19 – Environmental Procedures.

#### **1.3 MEASUREMENT PROCEDURES**

- .1 This work shall be incidental to the contract price proposal and will not be measured for payment.

#### **1.4 DEFINITIONS**

- .1 Topsoil is the uppermost layer of soil that:
  - a. Contains the majority of plant roots.
  - b. Is normally referred to as the plough layer in agriculture soils.
  - c. Is typically darker in colour than the subsoil layer.

### **PART 2 PRODUCTS**

#### **2.1 MATERIALS**

- .1 Topsoil stock piled from within the project extents in areas that required stripping.

### **PART 3 EXECUTION**

#### **3.1 PREPARATION OF EXISTING GRADE**

- .1 Verify that grades are correct. If discrepancies occur, notify the Departmental Representative and do not commence work until the issue has been resolved.
- .2 Grade subgrade slopes, eliminating uneven areas and low spots, ensuring positive drainage. Slopes may require contouring and shaping to provide a more natural appearance prior to placing stripped topsoil material. Contractor shall contour slopes as shown on the drawings.
- .3 Remove debris, roots, branches in excess of 300 mm length, stones in excess of 100 mm diameter, and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials, and petroleum products. Remove debris that protrudes more than 75 mm above surface.

### **3.2 PLACING AND SPREADING OF TOPSOIL**

- .1 Place stripped topsoil material after the subgrade material is placed as per these specifications.
- .2 Spread stripped topsoil material in uniform layers to a minimum depth of 100 mm after settlement.
- .3 Manually spread stripped topsoil material around trees, shrubs, and obstacles and blend 1 m into existing landscape.
- .4 The Contractor shall not perform work under adverse field conditions such as frozen soil, excessively wet or dry soil, or soil covered with snow, ice, or standing water.

### **3.3 FINISHED GRADING**

- .1 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare a loose friable bed by means of raking and subsequent cultivation.
- .2 Consolidate stripped topsoil material to bulk density using appropriate equipment.
- .3 Leave surfaces tracked by bulldozer, or other track type equipment, with impressions parallel to the slope. Soil surfaces are to be firm against deep footprinting.
- .4 The Departmental Representative will inspect and test stripped topsoil material in place and determine acceptance of material, depth of stripped soil material, and finish grading.

**END OF SECTION**

## **SECTION 32 92 19 SEEDING**

### **PART 1        GENERAL**

#### **1.1        SCOPE AND INTENT**

- .1        Not required in this project.

**END OF SECTION**