**SECTION 31 23 16.26**

# Rock REMOVAL

**BASED ON DFD MASTER SPECIFICATION DATED 09/01/2015**

This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items, or modify what is currently written. The Division of Facilities Development expects changes and comments from you.

# PART 1 - GENERAL

**SCOPE**

The work under this section shall consist of providing all work, materials, labor, equipment, and supervision necessary to complete drilling and blasting of rock for removal, as required in these specifications, on the drawings and as otherwise deemed necessary to complete the work. Included are the following topics:

PART 1 - General

Scope

Related Work

Definitions

Reference Standards

Submittals

Quality Assurance

Storage

Permits

Qualifications

Measurement and Payment

PART 2 - Materials

General

PART 3 - Execution

General

Preblast Survey

Vibration Control and Monitoring

Blasting Plan
Test Blasts

Overburden Soil

Drilling

Blasting

Rock Breaking

Rock Excavation

#### RELATED WORK

***(Note to the Designer: A/E shall determine if this work will impact other related work or Contractors and should revise these specifications accordingly to only include those sections that apply to the project.)***

Applicable provisions of Division 1 govern work under this Section.

Related work specified elsewhere:

Section 02 32 00 – Geo Technical Investigation

Section 30 05 00 – Common Work Results For All Exterior Improvements

Section 31 25 00 – Erosion Control

Section 31 23 16.13 – Trenching

Section 31 20 00 – Earthmoving

Section 00 00 00 – (Section Title)

## DEFINITIONS

Rock Removal is classified as all rock excavation of hard, solid rock in ledges, bedded deposits, and unstratified masses, and all conglomerate deposits or any other material so firmly cemented they present all the characteristics of solid rock, and the A/E or DFD Project Representative determines it is impracticable to excavate this material without blasting or using rippers. Rock Removal also includes removing all rock boulders having a volume of one cubic yard or more. The classification of rock removal does not apply to crushed aggregate or asphaltic base or surface courses, or to concrete base or surface courses.

## REFERENCE STANDARDS

International Society of Explosives Engineers

### SUBMITTALS

Prior to starting work, the Contractor shall provide the DFD Project Representative with 6 copies of the following:

* Blasting Licenses
* Blaster’s Certificate of Insurance
* Pre-Blast Survey
* Blasting Plan
* Material Storage Plan

Each week during blasting operations, the Contractor shall provide the DFD Project Representative with 3 copies of the following:

* Daily Explosive Material Consumption Log
* Daily Blasting Log
* Video Record of Blasting

**QUALITY ASSURANCE**

***(Note to the Designer: A/E shall contact the DFD Project Manager to determine if existing quality assurance testing is necessary for rock blasting. Modify the contents of this section accordingly.)***

The Contractor shall be solely responsible for quality assurance associated with rock blasting. Quality assurance efforts undertaken by the Contractor shall include, but not be limited to the following:

Pre-Blast Survey: Conduct a pre-blast survey as described in subsequent sections of this specification.

Daily Explosive Material Consumption Log: Maintain a daily record of the storage and use of explosive materials. Provide records of the class and quantities received and issued and the total remaining on hand at the end of each day. Check the remaining explosive inventory each day and report any discrepancies that would indicate a theft or loss of explosive material.

Test Blasting: Conduct test blasting as described in subsequent sections of this specification

Blasting Log: Provide a daily blasting log, summarizing blasting operations for that day. Include the following information in the daily blasting log:

* Station limits of the shot
* Plan and section view of the drill pattern including hole diameter, hole depth, hole angle, overburden depth
* Loading diagram showing type, trade name and amount of explosives and primers.
* Initiators sequence of blast holes including delay type, delay system and times in each blast hole.
* Blast times.
* Results of blasting.

Video Recording of Blasts: Video record each blast. Provide audio commentary describing blast, including results of blast. Index the tapes to allow identification and access of each blast.

#### storage

All explosive material shall be stored in accordance with the Wisconsin Administrative Code, Chapter SPS 307 – Explosives and Fireworks, and the project material storage plan.

##### Permits

Contractor shall be solely responsible for obtaining and paying for all permits necessary to complete the work.

If blasting, submit “Notice of Blasting in Community” (Form SBD-7336, current version) to the Wisconsin Department of Safety and Professional Services and other applicable agencies (fire department, law enforcement office, etc…). Obtain and pay for other blasting permits as required by local governments.

***(Note to the Designer: Enumerate and other required permits and/or note if any permits will be obtained by DFD or other state agency.)***

**qualifications**

The Contractor conducting rock blasting shall be a State of Wisconsin licensed blaster, specializing in rock blasting.

The Contractor shall have a minimum of 10 years experience in rock blasting. The Contractor shall demonstrate the prerequisite experience and knowledge by providing a minimum of 5 references for projects having similar size and scope.

A Contractor that is unable to demonstrate the prerequisite experience shall be considered unqualified and will not be allowed to complete the work.

#### measurement and payment

(Note to the Designer: The A/E shall contact the DFD Project Manager to determine the method of measurement and payment for Rock Removal. At the DFD Project Manager’s discretion, Rock Removal may be compensated as an incidental cost to the Lump Sum Base Bid if rock borings have been completed and the amount of rock excavation is known, or paid as a unit price item. As part of this section, note how Contractor is to bid the rock removal for the project. If rock removal quantity is unknown and will be included in bid as a unit price item be sure to include unit price item and expected quantity on the bid form.)

**PART 2 - MATERIALS**

(Note to the Designer: Edit material requirements as necessary to account for local variations in material availability. Comply with the substantive requirements of the materials described below.)

**general**

All explosives and related material shall meet the requirements of all applicable federal, state, and local regulations, as well as the recommendations of the International Society of Explosives Engineers.

Store all explosives in accordance with all local, state and federal regulations.

**PART 3 - EXECUTION**

**GENERAL**

Review drawings and prepare work plan and schedule for rock removal. Coordinate activities with institution, agency, DFD, A/E and other contractors working onsite.

#### preblast survey

Conduct a pre-blast survey prior to initiating any blasting operations.

The pre-blast survey should document the condition of all buildings, structures and utilities located within 1500’ of the blasting operations. Provide photos and/or video footage of pre-blast conditions.

Provide Owners 1 week written request via certified mail to conduct pre-blast survey. If owners or occupants fail to allow access to property for the pre-blast survey, send a certified letter to the Owner or occupant documenting attempt to contact. Include all notification in pre-blast survey report.

Provide the DFD Project Representative and A/E with one (1) electronic copy in pdf format of the pre-blast survey report. Do not initiate blasting until DFD Project Representative has completed a review of the pre-blast survey and authorized starting blasting.

The Contractor is solely responsible for any damage resulting from blasting.

**vibration control and monitoring**

Based on the nature of the project and the results of the preblast survey, provide vibration monitoring and control as necessary.

Retain a qualified, independent vibration specialist to complete vibration monitoring and establish safe vibration limits.

Record all results of vibration testing, including information on testing equipment, test methods, test results, and determination of safe vibration limits.

If vibration limits are exceeded, stop all blasting until potential damage has been assessed, and corrective action has been taken to lower vibration

**blasting plan**

Complete a blasting plan prior to initiating blasting operations.

Provide the DFD Project Representative and A/E with one (1) electronic copy in pdf format of the pre-blast survey as part of the project Quality Assurance. Do not initiate blasting until DFD Project Representative has completed a review of the blasting plan and authorized starting.

The blasting plan should include specific information regarding proposed materials and methods, including the following;

* Details of the drilling and blasting patterns
* Disturbance limits of each shot, including critical distances to existing structures
* Plan and section view of proposed disturbed bedrock areas created by blasting
* Loading diagrams including depth, diameter, type and amount of explosives, type of initiators
* Initiator sequencing including delay times and delay system.
* Manufacturer’s data sheets for all explosives, primers and initiators.
* Procedure for correcting misfires.
* Flyrock, airblast and vibration control requirements

**test blastS**

Prior to commencing full-scale blasting operations, conduct test blasts to verify the adequacy of the blasting plan. Drill, blast and excavate test sections to verify the proposed hole spacing, hole depths, explosive quantities, delay times, and overburden depth. Revise the blasting plan based on the results of the test blasts.

**overburden SOIL**

Complete all excavation at the site in accordance with Section 31 20 00 – Earthmoving.

Remove all topsoil from the site prior to blasting to avoid contamination of topsoil with shot rock. Stockpile topsoil in location that will not interfere with blasting operations or other construction.

Remove and stockpile overburden soil in accordance with the blasting plan. Remove potentially dangerous boulders or other material located beyond the excavation limits.

**drilling**

Drill holes in the locations and diameters specified in the blasting plan. Holes shall be drilled within a distance no greater than 2 hole diameters from the staked location.

After drilling holes, verify that hole is free of obstructions for its entire depth. Re-drill obstructed holes.

When pre-splitting, drill a line of buffer holes if detonation of production holes is damaging the pre-split line.

Do not drill production blast holes lower than the bottom of the controlled blast holes.

**blasting**

Place charges in holes in a manner that will not cause caving. Stem the upper portion of holes using sand or aggregate material.

Use the type and quantity of explosives as specified in the blasting plan.

Provide blasting mats or cover soil to prevent flyrock. Adjust blasting methods as necessary when working to prevent flyrock damage.

Use controlled backslope blasting techniques to form exposed final rock cut faces. Adjust the drill inclination angle so that the required slope is obtained.

When trim blasting, detonate the cut face after detonation of all production holes; use appropriate delays.

Where pre-splitting, detonate the production blast after detonation of the presplit blast; use appropriate delays. Use standard explosives manufactured for pre-splitting.

Do not allow personnel to enter the blast area for 5 minutes following a blast. After the delay, the blaster shall enter the blast area and check for detonation in all holes prior to any other personnel. If misfires are detected, the blaster and other essential personnel shall correct the misfire in accordance with the blasting plan.

**rock breaking**

Break rock using trenchers, hydraulic breakers, rippers or other specialized equipment.

Break rock to lines and grades shown on the drawings, or as required to complete the work. Finished rock surface should be relatively uniform.

#### Rock excavation

Excavate to elevations and dimensions as shown on the drawings and as necessary to complete construction. Excavations shall be sufficiently deep to provide for all proposed bedding, base course or other subgrade materials.

Slope and shore excavations as necessary to complete the work and comply with all applicable OSHA regulations.

Notify DFD Project Representative if correction of excessive rock breaking and/or over-excavation is necessary. Said excavations will be corrected based on recommendations of DFD Project Representative or DFD’s geotechnical consultant. Contractor will be responsible for all costs associated with correcting these excavations, including fees charged by DFD’s geotechnical consultant.

Segregate the various materials excavated. Reserve material meeting the requirements of backfill for the project location. Excavated material that does not meet the requirements of backfill, and excess excavated material, shall be removed from the site and disposed by the contractor, unless directed otherwise by other specification sections or the DFD Project Representative.

Locate backfill and spoil piles in accordance with OSHA requirements, and so that it does not interfere with public travel, adjacent landowners or other construction activities.

**END OF SECTION**