

APPENDIX I

Blasting / Rock Excavation Specification

SECTION 02318 - ROCK EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Removal including, drilling, blasting, and protection of rock excavation.

B. Related Sections

1. Section 02230 – Site Clearing. Clearing of trees, brush, and vegetation prior to excavation.
2. Section 02300 – Earthwork: Excavation, filling, and compaction of earth materials and rock fill.

1.2 REFERENCES

A. National Fire Protection Association (NFPA)

1. NFPA495 - Code for Manufacturing, Transportation, Storage, And Use of Explosive Material

B. United States Department of Interior, Bureau of Mines

1. Seismic Effects of Blasting

C. Occupational Safety & Health Administration (OSHA)

1. 29CFR1910.109 - Explosives and Blasting Agents

1.3 DEFINITIONS

A. Rock Excavation: Removal of igneous, metamorphic, or sedimentary rock or stone, boulders over two cubic yards in volume in open areas and one cubic yard in volume in trenches; and masonry, concrete, or solid frozen soil that cannot be removed by rippers or other mechanical methods and, therefore, requires drilling and blasting.

1. The excavation and disposal of all "Rock Excavation" that is indicated by the Soils Report shall be considered unclassified excavation and shall be included with site work grading as part of the lump sum base bid.
2. If "Rock Excavation" is required that is not indicated by the Soils Report, the Wal-Mart Construction Manager shall be notified prior to such rock excavation, and he must then visit the site and verify the necessity for excess "Rock Excavation," determine an estimated quantity and provide the Contractor written approval to proceed. In the event the estimated quantity is exceeded, the Wal-Mart Construction Manager shall again be notified to establish a revised estimated quantity and authorize the Contractor to proceed. Payment for the authorized work shall be by a Change Order to the Contract.

B. Trenches: Excavations having vertical sides whose depths exceed its width, made for storm water drainage, sanitary sewer, water, and gas pipes, electric, communications, and steam conduits, and related uses.

1.4 SUBMITTALS

A. Submit Blasting Plan prior to any blasting and Monitoring Reports to the Owner and Governing Agencies for review.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA495, Bureau of Mines Seismic Effects of Blasting, and OSHA 29CFR1910.109 as applicable.

- B. Comply with all applicable laws, rules, ordinances and regulations of the Federal, State and local regulatory authorities and insurers that govern the licensing, transportation, storage, handling, use, and disposition of explosives.
- C. Prior to rock excavation, obtain and pay for all powder and blasting permits and licenses from regulatory agencies.
- D. If blasting is required or undertaken, the responsible Subcontractor shall be licensed in the State and shall possess a current blasting license issued by the appropriate regulatory authority and be permitted for the transportation of explosives if required.
- E. In case of conflict between regulations or between regulations and Specifications, the Contractor shall comply with the strictest applicable codes, regulations or Specifications.

1.6 SITE CONDITIONS

- A. Environmental Requirements: Determine environmental effects associated with proposed work and safeguard those concerns as regulated by law and local governing agencies by reasonable and practical methods.
- B. Existing Conditions: The Contractor shall be responsible for any and all damage and/or injury from the use of explosives. The Contractor shall save and hold harmless the Owner, Architect and Engineer from any and all claims from the use of explosives. Removal of materials of any nature by blasting shall be done in such a manner and at such times as to avoid damage affecting integrity of existing construction and damage to new or existing dwellings, structures and water wells in or adjacent to the area of the work. It shall be the Contractor's responsibility to determine the method of operation to ensure desired results and integrity of completed work. All damage caused by the Contractor's blasting operations shall be repaired to the full satisfaction of the Owner at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Explosives, detonator/delay device, and blast mat materials shall be type recommended by explosive supplier and shall comply with requirements specified herein.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify site conditions and note subsurface conditions affecting work of this section.
- B. Identify required lines, levels, and elevations that will determine extent of proposed removals.

3.2 ROCK EXCAVATION

- A. Cut rock to form level bearing at bottom of footing and trench excavations. Remove shaled layers to provide sound and unshattered base for footings or foundations. Contractor shall consider reuse of excavated materials on site in accordance with Section 02300. If material cannot be utilized on site, dispose of material offsite.
- B. If placed in embankments, perform rock excavation in manner that will produce material of such size as in accordance with Section 02300. Remove rock to allow for construction and/or installation of the site and building improvements as indicated on Construction Drawings. Remove loose or shattered rock, overhanging ledges and boulders which might dislodge.
- C. Use lean concrete or suitable materials as directed by registered geotechnical engineer to replace rock overblast or over excavation in building and expansion area to facilitate placement of utilities and foundations systems.

3.3 ROCK BLASTING

A. General

1. The drilling and blasting methods and programs shall be those necessary to accomplish any and all rock excavation required for completion of the improvements shown on the Construction Drawings in accordance with the procedures specified herein. Do not use explosives as a primary means of transporting material outside the excavated prism.
2. Blasting work shall be performed only with necessary permits from all regulatory authorities and after completion of the preblast survey. Blasting work shall take place only after persons in the vicinity have been notified and have reached positions of safety. Take appropriate precautions to prevent all persons from entering the blasting area. Use methods and programs that will prevent damage to, but not limited to, adjacent dwellings, structures, public domain, natural resources, habitat, existing wells and landscape features and that will minimize the scattering of rock, stumps or other debris. All affected roadways shall be inspected, cleared, and opened to traffic within 1 hour of completed blasting or as required by governing authorities.
3. Complete all blasting with experienced powdermen licensed to use explosives in the State.
4. Conduct blasting at such hours (between ___ a.m. to ___ p.m.) so as not to disrupt surrounding residences and businesses, and in accordance with Federal, state and local regulations and/or ordinances with regard to noise.
5. Take all precautions necessary to warn and/or protect any individuals exposed to his operations prior to any blasting. Blasting mats or other approved flyrock protection shall be employed as necessary to protect areas adjacent to blasting.
6. Develop and maintain records covering pertinent data on the location, depth and area of the blast, the diameter, spacing, depth, overdepth, pattern, amount, distribution and powder factor for the explosives used per hole and per blast; the sequence and pattern delays, and description and purpose of special methods. Provide a copy of the records to the Owner upon the Owner's request. Receipt and acceptance by the Owner of blasting data will not relieve the Contractor of responsibility to produce satisfactory results as set forth in these specifications. Drilling and blasting shall be done only to the depth, amount and at such locations, with explosives of such quantity, distribution, and density that will not produce unsafe or damage rock surfaces or damage rock beyond the prescribed excavation limits. The Contractor shall be responsible for the cost of removal of overblast and also for the cost of placement and compaction of suitable replacement fill where overblast removal is required or occurs.
7. When a drilling and blasting program results in damage to the excavation or unacceptable peak particle velocity or frequency values as specified herein, the Contractor will be required to devise and employ revised methods that will prevent such damage or unacceptable ground motions at no cost to the Owner. The revisions may include special methods such as presplit and zone blasting, shallow lifts, reduction in size of individual blasts, small diameter blast holes, closely spaced blast holes, reduction of explosives, greater distribution of explosives by use of decking and primacord or variation in density of explosives and chemical or mechanical splitting of the rock.

B. Explosives

1. Take special precautions for proper use of explosives to prevent harm to human life and damage to surface structures, utility lines, or other subsurface structures.
2. Store, handle, and employ explosives in accordance with Federal, state and local regulations, or, in the absence of such, in accordance with the provisions of the NFPA and OSHA.

C. Blasting Vibration And Limit Criteria

1. The amount of vibration, frequency and overpressure generated by blasting shall not exceed regulatory statutes or directives established by State, local or other authorities. In no case shall the maximum Peak Particle Velocity (PPV) exceed the limits indicated on Figure B-1, Appendix B, of the United States Bureau of Mines Report of Investigations, RI 8507, 1980 or latest edition.
2. The peak airblast overpressure measured at the location of the nearest occupied, aboveground structure (considering wind direction) shall not exceed 0.014 psi.

D. Preblast Survey

1. General:

- a. Conduct a preblast survey prior to initiating blasting work. Preblast survey shall be performed by a registered Professional Engineer or specialized consultant licensed in the State of the work covered under this contract and specialized in conducting preblast surveys.
 - b. The preconstruction/preblast survey shall consist of documenting conditions of all existing dwellings and structures located within a minimum of 500 feet of the limits of all work requiring rock blasting prior to commencement of blasting or further if required by Federal, state or local regulations.
 - c. The purpose of the preblast survey is to determine the conditions of existing dwellings, structures and water supply wells and document any pre-existing defects and other physical factors that could reasonably be affected by the blasting. Structures such as dams, ponds, pipelines, cables and transmission lines, cisterns, structures of historical significance, and/or structures with unusually costly or vulnerable contents shall be included. The preblast survey shall also note the nature and sensitivity of livestock that may be affected by the blasting.
2. Examination of and Preparation for Survey:
- a. The Contractor shall contact the property owners (or their legal representative) of properties within a minimum of 500 feet of the limits of all blasting work in order to obtain permission to conduct a survey of their property. If the property owner does not grant the Contractor permission to conduct the survey, the Contractor shall contact the property owner a second time by registered mail/return receipt requested. The second request for permission to conduct the survey shall include a description of the survey to be performed and the purpose of the survey. At least 72 hours prior to start of blasting work, notify the appropriate local regulatory authority of any property owners who refuse access for the preconstruction survey.
 - b. Notify the property owners at least 48 hours prior to conducting the preblast survey. After completion of the survey, two copies of the preblast report shall be submitted to the appropriate local regulatory authority for their reference if required. Additionally, one copy shall be kept on file at the location of the project and one copy provided to the Owner upon request.
3. Method:
- a. The preblast survey shall include a detailed examination of the interior and exterior of structures located within a minimum of 500 feet of the limits of blasting work. Color photographs, videotapes, and written descriptions shall be taken as required to document the condition of areas within the limits of the survey area. Particular note shall be made of evident structural faults or deficiencies, or recent repairs.
 - b. The preblast survey shall also include an assessment of water supply wells located within a minimum 500 feet of the limits of all blasting work. This assessment shall include the following items:
 - 1) Information regarding the date of construction of the well, depth, method of construction, yield, water quality and any other existing available data will be requested from each well owner and/or the installer, provided the installer is known.
 - 2) A short duration pump test shall be performed on each well utilizing the existing pump that services each well. The pump shall be activated, the volume of water measured and the drawdown in the well measured for a 1-hour or less period until approximate steady state conditions are achieved. The data obtained from these measurements shall be used to estimate the approximate yield of each well.
 - 3) Upon completion of the above-described short duration pump test, obtain a groundwater sample from the well and submit to a State certified water quality laboratory. Laboratory shall analyze sample for iron, manganese, total dissolved solids, turbidity and total coliform.
4. Survey Report:
- a. The Contractor shall prepare a written report summarizing the results of the preblast survey. The final written report shall be signed and sealed by the Contractor's qualified inspector. The report shall contain the following:
 - 1) Location and description of each property
 - 2) Descriptions of the conditions of the on-site elements
 - 3) Summary of the visual inspection
 - 4) Color photographs, sketches, and videotape with vocal summary
 - 5) All data developed from the water supply well assessment
 - b. Provide videotapes to include supplemental information, as required. Pictorial documentation shall be of professional quality and shall be provided with a scale, where practicable. Clearly label pictorial documentation with an identification number, name of the project and the Engineer or quali-

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fied person conducting the survey, name of the property owner, date the picture or video tape was taken, and sufficient information to determine the location of the area in question.

- c. The Contractor’s inspector shall immediately report in writing to the Contractor any findings that, in his opinion, indicate that any structure or well will be adversely affected by the required construction and blasting.
- d. If, during the course of construction and blasting, the Contractor is requested by an adjacent property owner to view alleged damage to property, the Contractor shall give written notice to the Owner prior to the Contractor’s visit to the adjacent owners property.

E. Blast Monitoring

- 1. Contractor shall perform seismic blast monitoring in accordance with State and local regulations.
- 2. Contractor shall provide monitoring of blasting vibrations and over-pressures to allow evaluation of compliance with the specified vibration/over-pressures to criteria. As a minimum, the Contractor will monitor each blast as follows:
 - a. Monitor vibrations at the exterior walls of all structures within 500 feet of each blast location.
 - b. If no structures are located within 500 feet of the blast location, monitor vibrations at three equally spaced radial points located a minimum of 500 feet from the blast locations.
 - c. Monitor over-pressures for all structures within a minimum 500 feet of the blast.
- 3. If requested by the Owner, report vibration/overpressure-monitoring results to the Owner within two hours of blasting. Monitoring performed by the Contractor does not relieve the Contractor of responsibility for control of vibration and overpressure during blasting operations.

3.4 ROCK CUT FACE EXCAVATION

- A. The slope of the soil above the top of any permanently exposed rock cut face shall be no steeper than 3(H):1(V) unless otherwise noted on the Construction Drawings. Slope of the rock face shall meet the requirements below.

TYPE	<u>OF ROCK SLOPE</u>	<u>E (Horizontal to Vertical)</u>
	Solid limestone or sandstone	_____
	Interbedded limestone, sandstone or shale	_____
	Layered shale (no hard rock)	_____

- B. Benches of at least ten feet in width at a maximum of twenty feet in elevation intervals or as noted on the Construction Drawings. The benches shall serve to provide rock traps and divert water from the rock face.

3.5 ROCK TRAP

- A. Locate rock traps at the base of permanently exposed rock slopes and construct as indicated in the Construction Documents or Blasting Plan.

3.6 OVEREXCAVATION AND BACKFILL

- A. Over excavation which is required to remove unsuitable natural undisturbed bedrock weakened by weathering or other cause not inflicted by the Contractor shall be immediately reported to the Owner and performed as directed by the Owner, and the theoretical lines and grades will be adjusted accordingly. Material outside the excavation limits which are disturbed due to the fault or negligence of the Contractor or due to his failure to exercise sound construction practices, shall be either replaced by the Contractor with suitable materials (earth or concrete), or bolted, or both as directed, at no cost to the Owner.

END OF SECTION

