

SECTION 312316.26
ROCK REMOVAL

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SECTION 312316.26
ROCK REMOVAL

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. Section 312316.13 - Trenching

1.2 REFERENCES

- A. National Fire Protection Association:
 - 1. NFPA 495 – Code for the Manufacture, Transportation, Storage, and Use of Explosive Materials.
 - 2. PSHA 2207 – Construction Industry Standards, Subpart T – Demolition.

1.3 QUALITY ASSURANCE

- A. Explosives Firm – Company Specializing in Explosives for disintegration of subsurface rock with 5 years of documented experience.

1.4 REGULATORY REQUIREMENTS

- A. Conform to applicable code for explosive disintegration of rock.
- B. Obtain permits from Authorities having jurisdiction before explosives are brought to site or drilling is started.
- C. The on-site supervisor of the blasting crew shall hold a current Georgia Explosives License and comply with all Georgia Blasting Regulations.
- D. All explosives shall be stored securely in compliance with all laws and ordinances, and all such storage places shall be clearly marked DANGEROUS EXPLOSIVES. Blasting caps, electric blasting caps, detonating primers and primed cartridges shall not be stored in the same magazine with other explosives or blasting agents. No explosive shall be stored on the project site.

1.5 SUBMITTALS

- A. Section 013300 - Submittal Procedures.

- B. Shop Drawings: Indicate proposed method of blasting, delay pattern, explosive types, and type of blasting mat or cover, and intended rock removal method.
- C. Survey Report: Submit survey report on conditions of buildings near locations of rock removal.

1.6 PROJECT CONDITIONS

- A. Conduct survey and document conditions of buildings near locations of rock removal, prior to blasting, and photograph existing conditions identifying existing irregularities.
- B. Advise owners of adjacent buildings or structures in writing, prior to executing seismographic survey. Explain planned blasting and seismic operations.
- C. Obtain seismic survey prior to rock excavation to determine maximum charges that can be used at different locations in area of excavation without damaging adjacent properties or other work.

1.7 SCHEDULING

- A. Section 013000 - Administrative Requirements: Coordination and project conditions.
- B. Schedule Work to avoid disruption to nearby occupied buildings.
- C. Conduct blasting operations between hours of 10:00 AM and 3:00 PM only.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Rock (Definition) – Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed ½ cu. yd. for bulk excavation or ½ cu. yd. for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
 - 1. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 24-inch maximum width, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom.
 - 2. Equipment for Bulk Excavation: Late-model, track-mounted loader equipped with a single tooth ripper rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force.
- B. Explosives – Shall be suitable for intended purposes at the Contractor’s option subject to review by the Owner and the Engineer.
- C. Delay Devices – Type recommended by explosives firm to be used as accessory to explosives.

- D. Blasting Mat – When the use of explosives is necessitated during prosecution of the Work, Contractor shall incorporate the use of blasting mats or type recommended by explosives firm to lessen the danger of projectiles occasionally resultant from blasting of rock.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 013000 - Administrative Requirements.
- B. Contractor shall verify site conditions and note irregularities affecting work of this Section prior to performing any operations involving explosives. Contractor shall submit to Owner for review, a detailed plan for using explosives to include, but not limited to:
 - 1. Sequence of Work
 - 2. Equipment
 - 3. Protection to be provided for existing structures to remain
 - 4. Personnel
 - a. Training
 - b. Previous experience with the use of explosives in similar situation
- C. Rock in utility trenches shall be excavated over the horizontal limits of excavation and to depths as follows:

Size of Pipeline (Inches)	Depth of Excavation Below Bottom of Pipe (Inches)
Less than 4	6
4 to 6	8
Over 6	12

Space below grade for pipe shall then be backfilled with minus ¾-inch crushed rock or gravel or other approved materials and tamped to proper grade.

3.2 ROCK REMOVAL - MECHANICAL METHOD

- A. Excavate for and remove rock by mechanical method.
- B. Where pipes are constructed on concrete cradles, rock shall be excavated to bottom of cradle as shown on plans.

- C. Where rock foundation is obtained at grade for over fifty percent (50%) of area of any one structure, the portion of foundation that is not rock shall be excavated below grade to reach a satisfactory foundation of rock. The portion below grade shall be backfilled with Class C Concrete.
- D. Where rock foundation is obtained at grade for less than fifty percent (50%) of any one structure and satisfactory rock cannot be found over the remaining area by reasonable additional excavation, the rock shall be removed for a depth of twelve inches (12") below grade and space below grade shall be backfilled with crushed stone as specified for pipelines.
- E. Rock excavation near existing pipelines and other structures shall be conducted with utmost care to avoid damage. Injury or damage to other structures and properties shall be promptly repaired to the satisfaction of the Owner and by the Contractor as his own expense.
- F. Rock excavation for all structures and adjacent trenches under this contract and any other rock excavation directed by the Owner shall be completed before construction of any structure is started in the vicinity.
- G. Contractor shall correct unauthorized rock removal by backfill to grade with Class C, 1,000 psi concrete in accordance with backfilling and compaction requirements of Section 312316.13-Trenching, at his own expense.

3.3 ROCK REMOVAL - EXPLOSIVE METHODS

- A. If rock is uncovered requiring the explosives method for rock disintegration and removal, the Engineer shall be notified immediately so that the surface can be examined. Blasting will not be permitted unless written authorization is given by Engineer. (All materials removed shall be considered common excavation.)
- B. The Contractor shall notify in writing prior to use of explosives, any owners of adjacent buildings or structures, and any public utility owners having structure or other installations above or below ground. Such notice shall be given sufficiently in advance so that they may take such steps as they may deem necessary to protect their property from injury and/or damage.
- C. Rock excavation by use of explosives shall be conducted with due regard for safety of persons and property in the vicinity and in strict conformance with requirements of local, State and Federal Ordinance, laws and regulations governing the use of explosives.
- D. Blasting shall be conducted so as not to endanger persons or property and whenever required, the blast shall be covered with mats or otherwise satisfactorily confined. The Contractor shall be held responsible for and shall make good any damage caused by blasting or accidental explosions.
- E. The Contractor shall permit only authorized and qualified persons to handle and use explosives.
- F. Smoking, firearms, matches, open flame lamps, sparks and other fires, flame or heat producing devices shall be prohibited in or near explosive magazines or while explosives are being handled, transported or used.

- G. No person shall be allowed to handle or use explosives while under the influence of intoxicating liquors, narcotics or other dangerous drugs.
- H. All explosives shall be accounted for at all times. Explosives not being used shall be kept in a locked magazine, unavailable to persons not authorized to handle them. The Contractor shall maintain an inventory and use record of all explosives. Appropriate authorities shall be notified of any loss, theft or unauthorized entry into a magazine.
- I. No explosives or blasting agents shall be abandoned.
- J. Contractor's employees authorized to prepare explosive charges or conduct blasting operations shall use every reasonable precaution to ensure safety including, but not limited to, visual and audible warning signs, flags, or barricades.
- K. The Contractor is responsible for incorporating the use of seismic monitoring should rock excavation, by use of explosives, occur within 150 feet of any residential structure and within 300 feet of any miscellaneous structure. Blasting conducted near dam or bridge foundations shall incorporate the use of seismic monitoring should such blasting occur within 25 feet of said dam and/or bridge foundation. Contractor shall maintain all seismic records and blasting logs to be furnished to Engineer upon request.
- L. Disintegrate rock and remove from excavation.
- M. Cut away rock at excavation bottom to form level bearing plane.
- N. Remove shaled layers to provide sound and unshattered base for pipe foundations.
- O. Remove excavated material from site.
- P. Correct unauthorized rock removal or overbreak in accordance with backfilling and compaction requirements at his expense.

3.4 FIELD QUALITY CONTROL

- A. Provide for visual inspection of bearing surfaces and cavities formed by removed rock for inspection by Engineer or his representative prior to laying of pipe.

END OF SECTION 312316.26