

**SECTION 02310**

**ROCK AND BOULDER EXCAVATION**

**PART 1 GENERAL**

**1.01 EXTENT OF WORK:**

- A. The Work to be done under this Section consists of furnishing all materials, labor, tools and equipment and performing all operations to complete rock excavation.
- B. No hardpan, soft or disintegrated rock which can be removed with a hand pick or power-operated excavator or shovel, no loose, shaken or broken stone in rock fillings or elsewhere and no rock exterior to the maximum pay limits as indicated on the Drawings, which may fall into the excavation, will be classified as "rock."
- C. Work to include protection of existing structures, utilities, roadways, adjacent properties, new construction, workers, Authority's employees, agents and inspectors, all abutters and the public from damage or injury from excessive ground vibrations and Rock block movements.
- D. Blasting methods are strictly prohibited.

**1.02 RELATED SECTIONS**

- A. SECTION 01060 – PERMITS AND REGULATORY REQUIREMENTS
- B. SECTION 01300 – SUBMITTALS
- C. SECTION 01390 – CONDITION SURVEYS
- D. SECTION 01400 – QUALITY CONTROL TESTING
- E. SECTION 01565 – NOISE CONTROL
- F. SECTION 02200 – EARTHWORK
- G. SECTION 02495 – GEOTECHNICAL INSTRUMENTATION

**1.03 REFERENCES**

- A. Occupational Safety and Health Administration - Construction Standards for Excavations, 29 CFR Part 1926.650-.652.

**1.04 DEFINITIONS**

- A. Rock – intact mass of stone or bedrock.

- B. Boulder – buried rock, buried concrete, and buried masonry exceeding 1 cy in volume which requires removal by Rock Excavation.
- C. Rock Excavation – The removal and disposal of Rock, Boulders, which, in the opinion of the Authority requires systematic drilling, wedging, sledging, cutting, barring, jack hammering, hoe ramming, hydraulic splitting or expansive chemical splitting before it can be removed by Conventional Mechanical Excavation Equipment.
- D. Soil Excavation – The removal of earth, including Boulder less than 1 cubic yard in volume, soft or weathered Rock, hardpan, and till that can be removed by Conventional Mechanical Excavation Equipment. Soil Excavation shall include all excavation of earth materials that are not considered as Rock Excavation. Rock fragments, Boulders, buried masonry, or buried concrete less than 1 cubic yard which can be removed without resorting to Rock Excavation shall be considered as “Soil Excavation”.
- E. Conventional Mechanical Excavation Equipment – a bulldozer or tractor, drawing a single tooth hydraulic ripper with a minimum drawbar pull of 56,000 pounds. In deeper excavations or in locations of limited space, where a bulldozer or tractor cannot operate, an excavator using rippers, multi-processors, and hammers to breakdown the Rock.
- F. Loose or disintegrated Rock, loose or rotted shale, nested stones, hardpan and the like shall not be considered as Rock or Boulder.

#### 1.05 QUALIFICATIONS (NOT USED)

#### 1.06 REQUIREMENTS

- A. All rock removal operations shall be performed in compliance with the requirements of applicable Local, State, and Federal ordinances, codes, statutes, rules and regulations. Obtain and pay for permits and licenses required to complete the work of this section.
- B. Conduct vibration monitoring at all times during Rock Excavation in accordance with Section 02495 – Geotechnical Instrumentation. Take necessary measures to maintain peak particle velocities within the specified limits. Undertake modifications to excavation methods necessary to meet these requirements at no additional cost to the Authority. Repair any damage resulting from Rock Excavation.

#### 1.07 SUBMITTALS

- A. Refer to Section 01300 - SUBMITTALS for general requirements related to submittals.

- B. For each location Rock is encountered, submit detailed plan describing means and methods of Rock Excavation to be employed including but not limited to type of machinery, size and energy of any impact equipment, drilling pattern, size, depth and spacing for hydraulic or chemical splitting, chemical properties, material data sheet, transportation and handling of chemical agents to be used for chemical splitting, hours of operations, and schedule.
- C. Submit name and qualifications of the person(s) responsible for monitoring and reporting Rock Excavation vibrations.
- D. Coordinate submittal with vibration monitoring program submittal under Section 02495 – Geotechnical Instrumentation. Vibration monitoring program shall be in place prior to start of any excavation activities.

#### 1.08 QUANTITIES OF ROCK EXCAVATION

- A. Contractor shall include all costs for removal, handling, transportation and disposal of the following quantity of Rock Excavation in its lump sum price bid in Item No. 1.
  - 1. Rock Excavation – 50 cubic yards
- B. The Contractor shall include a unit price in the Schedule of Values. If the actual quantity of material varies upward or downward from the estimated quantity, the Contract Price will be adjusted in accordance with the provisions of Article 13 of Section 00700.
- C. Measurement for payment will be based on the actual number of cubic yards of rock excavated within the payment limits indicated on the Drawings. Payment is limited to the maximum trench width and depth below pipe as indicated on the Drawings.
  - 1. Trenches and excavations cut wider than the maximum width indicated on the Drawings will be considered for Contractor's convenience for which the Contractor will not receive compensation.

### PART 2 PRODUCTS

#### 2.01 CHEMICALS

- A. Any materials to be placed in the ground for expansive chemical splitting shall be non-toxic to the environment.

### PART 3 EXECUTION

#### 3.01 EXCAVATION

- A. Excavate Rock to the lines and grades needed to allow construction as indicated on the Drawings.
- B. Rock Excavation may be performed by drilling, wedging, sledging, cutting, barring, jack hammering, hoe ramming, hydraulic splitting, expansive chemical splitting, or other similar process in a manner, which does not cause damage to the existing structures or utilities, new construction, or affect other ongoing operations at existing facilities.
- C. If Rock below grade is shattered by Rock Excavation methods, and if the Authority considers the shattered Rock to be unfit for subgrade, remove the shattered Rock and refill the excavation with thoroughly compacted screened gravel or structural fill. All such removal and backfilling shall be at no additional cost to the Authority.
- D. Boulders and Rock less than 1 cubic yard in volume may be reduced in size by Rock Excavation methods to simplify its removal but shall not be considered as Rock Excavation for payment.
- E. When Rock or Boulder exceed one (1) cubic yard in volume is encountered during excavation that, in the opinion of the Authority, requires Rock Excavation, the Contractor shall expose the rock and notify the Authority prior to any breaking or removal. The Authority shall document the conditions before Rock Excavation proceeds.
- F. The excavated rock shall be removed and disposed of by the Contractor as specified for excess excavation disposal under Section 02200 – Earthwork.
- G. Replace disposed Rock and Boulder material with suitable soils.
- H. If rock is excavated beyond the limits of payment indicated on the Drawings, or specified, the excess excavation, whether resulting from over-breakage or other causes shall be backfilled by the Contractor at no additional cost to the Authority as specified below.
  - 1. In pipe trenches, excess excavation shall be backfilled and compacted in the same manner as specified for the material in the zone around the pipe under Section 02200.
  - 2. In excavations for structures, excess excavation in the rock beneath foundations shall be filled with concrete which shall have a minimum 28-day compressive strength of 3000 psi.
  - 3. Other excess excavation shall be filled with structural fill or controlled low strength material, placed and compacted in accordance with Section 02200 – Earthwork.

- I. Remove all dirt and loose rock from designated areas and shall clean the surface of the rock thoroughly to determine whether seams or other defects exist.

3.02 AIR QUALITY

- A. Control dust, fumes, vapors, gases, fibers, fogs, mists and other atmospheric impurities caused by the work.

3.03 SAFETY REQUIREMENTS

- A. Work shall be performed in a manner to minimize hazards and exposure of workers, other personnel and equipment to hazardous and potentially hazardous conditions.

**\*\* END OF SECTION \***