

**ITEM 206.0401 11 - PNEUMATIC EXCAVATION AND BACKFILL OF TRENCHES**

**ITEM 206.0402 11 - PNEUMATIC EXCAVATION AND BACKFILL OF TEST PITS**

**DESCRIPTION**

This work shall consist of performing Pneumatic Excavation and Backfill of Trenches or Test Pits in accordance with the contract documents and as directed by the Engineer. This work shall include the protection of tree roots for purposes of installing conduits, direct burial cables and other subsurface utilities.

**MATERIALS**

Materials shall meet the following requirements, as modified by any supplemental landscape specifications or special notes included in the contract documents:

**Pneumatic Excavating Tool.** Excavation shall be performed through the use of a pneumatic excavation tool with the following requirements:

The high air velocity excavation tool shall be specifically designed to fracture, pulverize, and displace porous and semi-porous soils without harming or causing damage to tree roots, existing subsurface utilities or other non-porous objects. The Contractor shall submit catalog cuts from the manufacturer verifying that the pneumatic excavation tool meets the following criteria:

Rated Operating Pressure:	6.2 – 7.0 bar
Air Stream Velocity at Cutting Head:	2,200 – 2,500 km/hr
Air Displacement:	4,000 – 5,000 L/min

**Air Compressor.** The air compressor may be either a portable or truck-mounted unit and shall be adequately sized as required to power the pneumatic excavation tool in accordance with the manufacturer's recommendations for the pneumatic excavating tool.

**Vacuum Truck.** A vacuum truck should be used to collect excavated spoil directly from the trench or pit.

**Containment Structure.** To prevent the spread of excavated soil onto adjacent roadways and areas beyond the designated work zone limits, the Contractor shall provide a mobile structure or barrier to contain the material dislodged by the pneumatic excavation tool from the trench or pit. Timber or corrugated metal shields, tents supported on tubular frames or other structures as approved by the engineer may be used.

**Root Protection**

Cotton Mats	711-02
Burlap	711-06

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**Backfill**

Topsoil	713-01
Limestone	713-02
Fertilizer	713-03
Organic Material	713-13

**CONSTRUCTION DETAILS**

The work shall be in accordance with SECTION 206-3 TRENCH, CULVERT and STRUCTURE EXCAVATION with modifications as follows:

The following is to be executed **PRIOR TO PNEUMATIC EXCAVATION**.

**Work Site Safety.** Pneumatic excavation shall be performed in compliance with all applicable OSHA regulations and the manufacturer's operating instructions. Adequate eye and ear protective equipment shall be worn by all crew members present at the work site.

The Contractor shall be responsible to provide adequate equipment and perform pneumatic excavation techniques properly to preclude movement of any air-borne soils onto adjacent roadways or other areas beyond the designated work zone limits. Failure to contain and/or collect the excavated soil will result in the immediate termination of pneumatic excavation until soil containment and/or collection procedures are determined adequate by the Engineer.

The Contractor shall keep the public at a safe distance from the work zone at all times by means approved by the Engineer.

**Operator Qualifications.** The excavating tool shall be utilized only by personnel having at least one year of experience operating the pneumatic excavation tool. The Contractor shall submit to the Engineer written certification from the equipment manufacturer or supplier of the operator's training and experience in the use of the pneumatic excavation tool.

**Arborist:** Unless otherwise directed by the EIC, all pneumatic excavation work shall be performed under the direction of an International Society of Arboriculture (ISA) Certified Arborist provided by the NYSDOT.

**Pre-Pneumatic Excavation Meeting.** Prior to the start of such excavation, the Contractor and its approved Operator for pneumatic excavation shall attend a meeting arranged by the Engineer with the Regional Landscape Architect, certified Arborist and other parties as appropriate, to review the requirements of this item including the schedule of operations, the mandatory presence of the Arborist, safety measures, reporting, etc.

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The contractor is required to submit a schedule of his anticipated pneumatic excavations at this meeting.

**PNEUMATIC EXCAVATION PROCEDURES**

**Dust Control.** The work area shall be watered thoroughly at least 24 hours in advance of but no more than 48 hours prior to the start of any pneumatic excavation to reduce the incidence of airborne dust resulting from the pneumatic excavation operation.

**Excavation - General.** Trench and test pit excavation using the pneumatic excavation tool shall be performed in accordance with the manufacturer's recommendations to remove soil without damage to the roots of trees and/or utilities either in or adjacent to the excavation.

**Test Pit Excavation.** Test pits indicated in the drawings or as directed by the Engineer to be dug within limits designated for pneumatic excavation shall be excavated prior to other trenching using the pneumatic excavating tool.

The limits of the excavation shall be those sufficient to determine existing utility type, size and/or condition. This work shall not relieve the Contractor of the responsibility to locate underground facilities as required under 16 NYCRR Part 753.

**Trench Excavation.** Pneumatic excavation shall be performed at locations as indicated in the drawings or as directed by the Engineer where trench excavation for conduit installation will occur within or in close proximity to the drip-lines of trees.

Trenches shall be excavated to a depth of 900mm, as indicated in the drawings or as directed by the Engineer.

**Root Protection.** The Contractor shall place wet burlap or cotton mats upon both the fibrous and structural roots immediately after they have been exposed by the pneumatic excavating tool. The burlap or cotton covering may be removed to perform inspection or utility installation operations, but the Contractor shall be required to keep the burlap or cotton towels wet and the roots moist until backfilling is complete.

The Engineer shall be immediately informed of any damaged tree roots. No tree roots may be pruned except as specifically authorized by the Arborist. In the case that the concentration of roots obstructs the placement of the conduit to the required line and grade, limited pruning may be necessary as directed by the Arborist. Tree roots in excess of 25 mm in diameter, measured at the edge of the excavation, shall be cut cleanly at the edge of excavation using a sharp cutting tool. All root pruning shall be performed under the direction of the ISA Certified Arborist.

**Conduit Installation.** Conduit and direct burial cables shall be installed in accordance with the

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applicable conduit specifications and details shown on the drawings, including bedding materials.

In order to facilitate trench backfilling on an expedited basis, the Contractor shall install conduit and direct burial cables in a continuous operation along with the pneumatic excavation operations to allow for backfilling of the trench within the same work shift.

The exposed root system will make “rolling” multiple sections of assembled conduit from the adjacent surface into the trench impossible. Therefore, workers shall pass each individual conduit section carefully through the root system for placement and assembly within the excavated trench.

**Trench and Test Pit Backfill.** Excavated trenches and test pits containing exposed tree roots shall be backfilled immediately after the Engineer approves the conduit and cable installations within the trench and/or the inspection of the test pit. The Contractor shall provide adequate work crews to backfill trenches and test pits within 24 hours of excavation.

Upon completion of inspection or installation work, the Contractor shall remove the burlap or cotton matting and begin backfilling operations.

Suitable excavated material may be used as backfill up to a depth of 300 mm below finish grade. The existing soil shall be amended with humus, peat, peat moss, or source-separated compost in the ratio of one part organic to seven parts excavated soil. If required, provide additional clean backfill material.

Backfilling of the trench and test pit excavations shall be performed with care not to damage the exposed roots. The Contractor shall compact the backfill material under the direction of the ISA Certified Arborist. The Contractor shall compact the backfill material to be commensurate with the density of the undisturbed adjacent soils unless otherwise directed by the ISA Certified Arborist.

Surface restoration including backfilling the top 300 mm of the excavation with approved topsoil, shall be performed separately under the appropriate items.

The Contractor shall properly dispose of excess and unsuitable excavated materials.

**Tree Condition Report.** The Contractor shall supply the ISA Certified Arborist with information as needed for the Arborist to prepare periodic reports to the Engineer and Regional Landscape Architect summarizing the number, type and condition of trees adjacent to each pneumatic trench excavation, duration of open trenches, and identify any root damage and actions taken.

**METHOD OF MEASUREMENT**

**Pneumatic Excavation and Backfill of Trenches** will be measured as the number of linear meters along the centerline of the excavated trench, including backfill, regardless of the number of conduits or direct burial cables installed within the trench.

**Pneumatic Excavation and Backfill of Test Pits** will be measured as the number of test pits excavated and backfilled in accordance with the contract documents or where directed by the Engineer.

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**BASIS OF PAYMENT**

The unit price per bid shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work.