

SECTION 02400
EXCAVATION SUPPORT

02400.01 GENERAL

A. Description

1. Excavation support shall include, but not necessarily be limited to, the designing, furnishing, and placing of timber or steel sheeting or other systems for excavation support in accordance with the Contract Documents.
2. All work shall comply with Title 29, Code of Federal Regulations, Part 26, Subpart P (and other applicable sections) of Occupational Safety and Health Regulations for Construction and the requirement of MOSHA, Maryland Occupational Safety and Health Regulations for Construction.

B. Related Work Included Elsewhere

1. Excavation; Section 02220 and 02250.
2. Dewatering; Section 02512.

C. Quality Assurance

1. It shall be the Contractor's responsibility to select materials, methods, and equipment, and design an excavation support system which will:
 - a. Support earth pressures, utility loads, equipment, applicable traffic and construction loads, and other surcharge loads in such a manner as will allow the safe and expeditious construction of the permanent facilities without movement or settlement of the ground and will prevent damage to or movement of adjacent buildings, structures, and utilities.
 - b. Support the maximum loads that can occur during construction. For the purpose of this section, the design load means the maximum load the support member will have to carry in actual practice, and the proof load means a specified test load greater than the design load.
 - c. Carry bottom of support system to a depth below the main excavation adequate to prevent lateral and vertical movement. Where additional excavation is carried below the main excavation, provide means to prevent movement of the main excavation supports.
 - d. Allow the required open excavated space.
 - e. Allow for staged removal to conform to construction and backfill sequence, or as shown on the Plans.

- f. Provide diagonal bracing where needed for stability of the system. Arrange wales, struts, posts, and braces in such a manner as will minimize interference with compaction of the backfill.

D. Submittals

When specified in the “Special Provisions”, the Contractor shall, prior to the installation of the excavation support system, submit to the Engineer working drawings and design data showing any or all of the following:

1. Submit working drawings showing proposed excavation support system including details, arrangement, and methods of construction for the proposed system and details illustrating the method for preloading the bracing. Show level of streets, struts, and shores, as applicable, and permissible depth to which excavation may be carried before such supports are installed and preloaded. Show full excavation depth load to be carried by various members of the support system; and, if required, the preloads. Submit appropriate design calculation including maximum theoretical deflections of support members.
2. Revised working drawing as required to show the actual locations of existing utilities in relation to the excavation support system. Show design and methods to overcome interference with such existing utilities and the excavation support system.
3. Proposed sequence of struts and shore removal as applicable and as related to concrete placement and backfilling operations.
4. Proposed method of installing sheet piling, including the sequence of driving, template, and driving equipment description.

02400.02 MATERIALS**A. Materials Furnished by the County**

The County will not furnish any materials for excavation support.

B. Contractor's Options

The Contractor may utilize the excavation support system of his choosing unless otherwise noted.

C. Detailed Material Requirements**1. Steel Sheet Piling**

Continuous interlocking type, ASTM A 328, provided with at least one 2-1/2 inch diameter handling hole on the centerline of the web located at least 6 inches from each end of the sheet pile.

2. Timber

Structural grade with a minimum working stress of 1100 pounds per square inch. Timber to be left in place; creosote or creosote-coal tar solution treated in accordance with AASHTO M 133.

02400.03 EXECUTION**A. General**

1. It shall be the Contractor's responsibility to support the sides and ends of excavations. All excavation support systems shall be designed and arranged so that it may be withdrawn as backfilling proceeds, without injury to the facility built under the Contract or to any adjacent facility.
2. All excavation support systems, unless otherwise noted, shall be withdrawn as the backfilling of the excavation proceeds.
3. Sheeting or other materials left in place shall be cut off by the Contractor at least 12 inches below finished grade.
4. When the depth of the excavation requires 2 lengths of sheeting, one above the other, the lower length shall be set inside the box stringers or wales of the upper length and driven down and braced as the excavation continues.
5. Driving heads and cushions for temporary sheet piling shall be used at the option of the Contractor. Driving heads and cushions used on permanent sheet piling shall be of proper configuration and construction to prevent damage to the piling.

B. Timber Sheeting

Timber sheeting shall be drift sharpened or leveled at the bottom so as to wedge adjacent boards in tight contact to prevent the loss of material from behind the sheeting.

C. Steel Sheet Piling

Steel sheet piling shall be driven in plumb position with each pile interlocked with adjoining piles for its entire length so as to form a continuous diaphragm throughout the length of each run of wall, bearing tightly against original ground. Drive to depth indicated on the Plans or to a firm seat against or into bedrock. Exercise care in driving so that interlocking members can be extracted, if required, without injury to adjacent fills. Do not drive piles within 100 feet of concrete less than seven days old. The methods of driving, cutting, and splicing shall conform to the approved working drawings.

D. Internal Bracing Support System

1. The internal bracing support system includes wales, struts, and shores.

2. Install and maintain all bracing support members in tight contact with each other and with the surface being supported.
3. When required, preload bracing members by jacking struts and shores at 50% of the allowable design load. Preload bracing members in accordance with methods, procedures, and sequence as described on the approved working drawings. Coordinate excavation work with installation of bracing and preloading. Use steel shims and steel wedges welded or bolted in place to maintain the preloading force in the bracing after release of the jacking equipment pressure.
4. Excavate to a depth no more than 2 feet below the point of support about to be placed. Install the support and preload immediately after installation and prior to continuing excavation.

E. Removal

1. Unless otherwise noted or directed by the Engineer, the Contractor shall remove the excavation support system once it has served its purpose.
2. The excavation support system shall be removed in such a manner that will not disturb or damage the installed facility or any adjacent land, facility, or improvement. Supports shall not be removed until the backfill within has been compacted to the required density.
3. The Contractor shall be solely responsible for the removal of the excavation support system and shall repair all damage resulting from the support system's removal at no additional cost to the County.
4. The Contractor may, with the approval of the Engineer, leave the excavation support system in place provided that no portion of the system extends above 12 inches below finished grade.

02400.04 METHOD OF MEASUREMENT

Excavation support will not be measured for payment.

02400.05 BASIS OF PAYMENT

Payment for excavation support will be included in the price bid for other related items of work.