

## SECTION 02200 - EXCAVATION AND BACKFILLING

### PART 1 - GENERAL

#### 1.1 GENERAL REQUIREMENTS

- A. Furnish all materials, labor and equipment required to accomplish all excavation, filling and grading as indicated on the drawings and specified herein.
- B. Contractor shall provide an archeological monitor and comply with the requirements of the Archaeological Monitoring Plan prepared by Cultural Surveys Hawaii.
- C. During excavation, if any archaeological significant items, such as artifacts, shell, bone, or charcoal deposits are found, stop work and notify the Engineer. The Owner shall pay for any investigation.
- D. Contractor shall provide water quality monitor and comply with the requirements of the Applicable Monitoring and Assessment Plan prepared by AECOS Inc. for this project.
- E. Contractor shall place all excavated material in the temporary construction sediment basins/drying beds and take every necessary precaution to prevent the contaminated material from entering Manoa Stream or the work area. Periodic removal of the dried material shall be hauled and dumped at a landfill that accepts this material and approved by the construction manager.
- F. Permits, Notice, Etc.:
  - 1. The Contractor shall procure and pay for all necessary permits or certificates that may be required in connection with this work.
  - 2. The Contractor shall work with DLNR and R.M. Towill Corp. to finalize all permit applications with their construction means and methods.
  - 3. The Contractor shall notify the University of Hawaii three (3) months in advance of start of construction with the proposed work schedule.
  - 4. The Contractor shall serve proper notices and consult with the Engineer regarding any temporary disconnections of electrical or other utility lines in the area which may interfere with the removal work, and all such lines where necessary shall be properly disconnected before commencing with the work.
- E. Protection: Throughout the work, protection shall be provided for all roads, etc., along the excavation. Safe working conditions shall be maintained at all times for all personnel and barricades shall be provided and maintained.

#### 1.2 REFERENCE SPECIFICATIONS

Except as modified herein, all excavation and backfilling shall conform to the following specifications.

- 1. Excavation, Grading, Embankment:

The following sections of the Standard Specifications for Public Works Construction dated September 1986:

Section 13 .....	Structure Excavation and Backfill
Section 15 .....	Crushed Rock
Section 16 .....	Borrow
Section 17 .....	Embankment
Section 44 .....	Cement Rubble Masonry

### 1.3 APPLICABLE PUBLICATIONS

The following publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Copies of the soil reports and addendums are available for review at the Engineer's office.

1. Soils Investigation Report by Hirata & Associates, Inc. entitled "Soils Investigation, Manoa Stream Improvements at Woodlawn Drive Bridge, Honolulu, Hawaii" dated May 6, 2016.
2. American Society for Testing and Materials (ASTM) Publications
  - D1557-78 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in. (457mm) Drop

### 1.4 DEGREE OF COMPACTION

Degree of compaction is a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557, Method D, abbreviated hereinafter as a percent of laboratory maximum density.

### 1.5 OPTIMUM MOISTURE

Optimum moisture is the water content (percentage by weight) corresponding to the maximum dry density.

## PART 2 - PRODUCTS

### 2.1 DROP STRUCTURE BACKFILL MATERIALS

- A. Working course layer consisting of 12 inches of gravel, such as #3 Course or equivalent, shall be placed on the silty sand subgrade. The grouted rip-rap can be placed directly on the working base.
- B. Geotextile filter fabric shall be placed below the 12-inch gravel fill working base.
- C. Backfill placed below existing groundwater should consist of clean gravel, such as #3B Fine. Backfill placed above existing groundwater should consist of either onsite silty sand, silty gravel, or imported fill. Geotextile filter fabric should be placed between the clean gravel and the fill placed above it.

## PART 3 - EXECUTION

### 3.1 EXCAVATION

- A. All excavation of every description and of whatever substances encountered shall be performed to the depths indicated or as otherwise specified. During excavation, material suitable for backfilling shall be placed in an orderly manner, according to the plans, a sufficient distance from the banks of the stream to avoid overloading and to prevent slides, cave-ins or contamination. All excavated materials not required or suitable for backfill shall

be removed and wasted as indicated or as directed. Grading shall be done as may be necessary to prevent surface water from flowing into the stream or other excavations, and any water accumulating therein shall be removed by pumping or by other approved methods. Unless otherwise indicated, excavation shall be by open cut.

- B. Soft and yielding areas encountered should be overexcavated to expose firm natural material and the resulting excavation should be backfilled as stated in section 2.1.C above.
- C. Adequate shoring and bracing should be provided by the Contractor in accordance with DOSH and other governmental regulations for the utility trenches and other similar deep excavations.
- D. Excavation for Appurtenances: Excavation for structures and appurtenances shall be sufficient to leave at least 12 inches in the clear between the outer surfaces and the embankment or timber that may be used to hold and protect the banks. Any overdepth excavation below such appurtenances that has not been directed by the Engineer will be considered unauthorized and shall be refilled with sand, gravel, or concrete, as directed, at no additional cost to the Owner.
- E. Construction materials and excavated materials shall be covered during high winds to mitigate dust problem.

### 3.2 PROTECTIVE MEASURES

- A. All excavation shall be protected and guarded against danger to life, limb and property.
- B. Shoring, as required to safely preserve the excavations and earth banks free from damages resulting from the work, shall be provided and installed by the Contractor.
- C. All excavations shall be kept free from standing water. The Contractor shall pump and drain as necessary to remove water to the extent required in carrying on work. Grading shall be controlled so that the ground surface is properly sloped to prevent water runoff into structural foundation, open trenching excavations and adjacent buildings.
- D. The Contractor shall conduct operations with minimum interference to traffic. The Contractor shall confine all work equipment, materials and personnel as much as possible to the work area as indicated, so as not to interfere with the normal function of the adjacent roadway. The Contractor shall schedule all work that involves excessive noise, dust, dirt, or any other detrimental aspect of this work in order that there will be minimum disruption in normal roadway functions.
- E. When necessary and when directed by the Engineer, the Contractor shall provide and erect barriers, etc., with special attention to protection of personnel.
- F. Existing utilities are shown on the drawings in approximate locations for the convenience of the Contractor. The fact that any utility is not shown on the drawings shall not relieve the Contractor of his responsibility under this section. It shall be the Contractor's responsibility to ascertain the location of all existing utilities which may be subject to damage by reason of his operations.

The Contractor shall:

1. Support and protect all utilities during construction;
2. Notify the Engineer immediately of any damage to existing utilities caused by construction under this Contract; and

3. Reconstruct, at his expense, damaged portions of the utility system in accordance with the requirements and specifications of the Owner.

### 3.3 LAYING OUT

- A. The laying out of base lines, establishment of grades and staking out the entire work shall be done by a surveyor (licensed in the State of Hawaii) at the expense of the Contractor and he shall be solely responsible for their accuracy. The Contractor shall erect and maintain substantial batter boards showing construction lines and levels.
- B. Should any discrepancies be discovered in the dimensions given on the drawings, the Contractor shall immediately notify the Engineer before proceeding any further with the work; otherwise he will be held responsible for any costs involved in correction of construction placed due to such discrepancies.

### 3.4 BACKFILLING

Except as otherwise specified for special conditions of overdepths, areas improperly backfilled shall be reopened to the depth required for proper compaction, then refilled and compacted as specified, or the condition shall be otherwise corrected as permitted by the Engineer.

### 3.5 FILL TESTING

All fill shall be tested by an independent testing agency and all test results submitted to the Engineer for approval. All costs of testing shall be borne by the Contractor. Testing shall be made throughout the area for each 6-inch compacted layer at locations determined by the Engineer. All test results must be approved before the Contractor can proceed with placing of topsoil, or base course.

END OF SECTION