

## SECTION 31 23 00

## EXCAVATION AND FILL

## PART 1 – GENERAL

## 1.1 SECTION INCLUDES

- A. Furnishing all labor, supervision, materials, equipment and incidentals as necessary to perform all excavation, backfill, fill and grading to complete the work shown on the Drawings and specified herein. The work shall include, but not necessarily be limited to, excavation for structures including all utility trenches, backfilling and fill, and disposal of waste and surplus materials.

## 1.2 RELATED SECTIONS

- A. Section 03 10 00 – Concrete Forming And Accessories

## 1.3 REFERENCES

- A. California and Federal OSHA Safety Standards.
- B. American society for Testing and Materials (ASTM)) Standards.

## 1.4 SUBMITTALS

- A. Contractor shall take a representative sample of proposed engineering fill, if required by the City, weighing approximately 75 lbs., at least thirty (30) days prior to the first date of anticipated use of such material. The City retains the right to request Contractor's Testing Agency to sample and test proposed engineering fill. City also retains the right to direct the Contractor's Testing Agency to perform additional random sampling and testing, at no additional cost to the City. Contractor shall provide all of its testing agencies' results to the City for review and approval.

## 1.5 QUALITY CONTROL

- A. All work shall comply with the rules and regulations of Local and State agencies having jurisdiction. Nothing contained herein shall be construed as permitting work that is contrary to such rules, regulations, and codes.
- B. Testing and Inspection
  - 1. The City will retain a Testing and Inspection Agency to provide the soil testing and inspection during the specified operations.
  - 2. Notify the City 48 hours prior to any filling or backfilling operation to allow for proper scheduling of tests and inspections.
  - 3. The Testing and Inspection Agency will:
    - a. Sample and test fill materials. Approve the site stockpile materials for fill.
    - b. Approve methods of compaction.

- c. Observe and provide emergency engineering control of excavation, preparation and compaction of subgrade, placement and compaction of fill and backfill material. Do not place forms, reinforcing, concrete, or fill material until excavation has been inspected and approved.
- 4. To accept excavated foundation surfaces and compacted fill will be based on the conducted inspections and tests. Inspection Agency will inform the Contractor immediately of any unsatisfactory observed conditions. No further work shall proceed until the unsatisfactory work to be corrected. It shall be the Contractor's sole responsibility to achieve the specified degree of compaction.

## 1.6 SITE CONDITION

### A. Existing Conditions and Requirements

- 1. Verify existing conditions and accept as is.
- 2. On-site access: Use on-site access route as designated.
- 3. Verify or determine location all underground utilities and avoid any damage. Should damage occur, notify the Engineer and repair at no additional cost to the City.

### B. Environment Requirements

- 1. Dust Control: Moist the ground during excavation operation, and moist the fill materials during fill and backfill operation.

## 1.7 PROTECTION

- A. Work shall be conducted so as to avoid injury to persons and damage to property.
- B. Protect excavation by shoring, bracing or sheet piling and other methods as required for preventing excavation cave-in.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

- A. Engineering Fill: Fill shall be the soil predominantly granular less than 3 inches in any dimension, free of organic and inorganic debris, and contain less than 20 percent mostly non-plastic fines passing a No. 200 sieve.

## PART 3 – EXECUTION

### 3.1 PREPARATION

- A. Take measures to prevent water from entering excavations.
- B. Take precaution to prevent soil from caving in during excavation.

- C. Do not undermine adjacent existing foundation during excavation if encountered.
- D. Notify Engineer at least 48 hours prior to commencing and upon completion of excavation.

### 3.2 COMPACTION

- A. Where referred to in the specifications, "compaction" or "relative compaction" shall refer to in-place density of soil expressed as a percentage of the maximum density of the same material as determined by ASTM D 1557.
- B. Compaction equipment or methods which may cause displacement or damage to structures or utility piping and conduit shall not be used.
- C. Required minimum density and maximum permissible lift thickness, of compacted fill:

Percent of Maximum <u>Dry Density</u> As Specified	Maximum Permissible <u>Lift, Inches</u> 8" (Loose thickness)
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- D. Place and compact material in uniform layers not exceeding those specified. Compact the fill material or recompact on-site soil to density 95% at footing and slab on grade, 90% at walkway.
- E. Where it is impractical to use large equipment for compaction or when such methods, in the opinion of the Engineer, are disturbing the surrounding natural subgrade, the fill shall be placed using hand-operated mechanical compactors. The lift thickness shall not exceed six (6) inches measured before compaction when hand-operated equipment is used.

### 3.3 FILLING AND BACKFILLING

- A. Preparation:
  - 1. Remove forms, water, rubbish and deleterious materials in areas to be backfilled. Any unsuitable materials shall be removed offsite.
  - 2. Scarify and recompact the surface of areas to receive fill to eight-inch depth until surface is free of ruts and even surface.
  - 3. Backfill shall not be placed until the area has been inspected.
- B. Placing and Compacting:
  - 1. Place fill materials to establish grades as shown.
  - 2. Spread fill material in uniform lifts not exceeding specified thickness.
  - 3. Before compaction begins, bring fill to water content which will permit proper compaction by either aerating material if it is too wet or spraying material with water if it is too dry.
  - 4. Mix each lift thoroughly before compaction to provide uniform distribution of water content.

5. Compact each layer uniformly to specified relative compaction. Compaction by flooding, pounding, or jetting will not be permitted.
6. Scarify and recompact any layer not attaining compaction until specified minimum compaction is obtained.
7. Stabilize each layer that is unstable before placing the next lift.
8. Remove all intrusive water, dry the subgrade and fill to proper moisture content where groundwater or rainwater enters areas to be filled. Re-establish compaction specified in last layer before proceeding with operations.
9. Remove and dispose excess fill or backfill material offsite at Contractor's expense.

### 3.5 UTILITY TRENCHING

#### A. Excavation

1. Excavate subsoil as required for utility line, such as storm drain, sanitary sewer, water, and piping to existing utilities.
2. Cut trenches sufficiently wide to enable installation of utilities.
3. Correct unauthorized excavation at no cost to the City.
4. Stockpile excavated material in the area as designated at site and remove excess material off the site.

#### B. Bedding

1. Bedding fill shall consist of 6" thick of well-graded sand or pea gravel to support the pipe and conduit.

#### C. Backfilling

1. Backfill trenches to contours and elevations with engineering fill materials, or local fill materials.
2. Do not backfill over porous, wet, or spongy subgrade surfaces.
3. Local Fill Material: Place and compact material in continuous layers not exceeding 6 inches and compact to the depth as shown.
4. Maintain optimum moisture content of backfill materials to attain required compaction density.
5. Remove and dispose surplus backfill materials off site.

#### D. Tolerances

1. Top Surface of Backfilling: To match existing required elevations.

#### E. Field Quality Control

1. Field inspection and testing will be performed under provisions of Section 01 45 00.
2. Compaction testing will be performed in accordance to ASTM D 1557.
3. If tests indicate work not meeting specified requirements, remove and replace the work for retesting at no cost to the City.

F. Protection of Finished Work

1. Recompact fills subjected to vehicular traffic where occurs.

3.6 DISPOSAL

- A. Surplus materials and debris shall be removed and disposed off site at Contractor's expense. The site condition shall be cleaned and be acceptable to the Engineer.

END OF SECTION