SECTION 31 20 00

EARTHWORK; EXCAVATION, FILLING AND GRADING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Excavating soil and other material for surface improvements.
B. Excavating soil and other material for drainage basins.
C. Placing fill.
D. Compaction of existing ground and fill.
E. Preparation of subgrade for other improvements.
F. Grading of soil.

1.2 RELATED SECTIONS

A. Contract General Conditions and Division 1.
B. Section 01 5000 – Temporary Facilities.
C. Section 31 11 00 – Clearing And Demolition.
D. Section 31 14 00 - Soil Materials.
E. Section 31 23 00 - Trench Excavation and Backfilling.

1.3 WORK NOT INCLUDED IN THIS SECTION

A. Trench Excavation and Backfilling: See 31 23 00.

1.4 REFERENCES

A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

1.5 DEFINITIONS

A. Utility: Any buried or above ground pipe, conduit, cable, associate device or appurtenances, or substructure pertaining thereto.

1.6 COORDINATION

A. Coordinate work with Owner’s personnel.
B. Verify that the location of existing utilities have been indicated at work site by utility authorities.

1.7 EXISTING UTILITIES

A. Refer to Contract General Conditions.

B. Where subsurface work involves more than the normal depth of excavation required for the removal and/or construction of surface improvements (surface improvements such as concrete work, paving, landscaping, signs, etc.), the Engineer will have made a diligent attempt to indicate on the plans the location of all main and trunkline utility facilities which may affect the Work. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities shall, therefore, be considered approximate only, until exposed by the Contractor.

C. Under circumstance similar to 31 20 00/1.7B., service laterals and appurtenances will have also been shown where information was available as to their location. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities shall, therefore, be considered approximate only, until exposed by the Contractor.

D. Determine exact location of existing buried utilities by:

1. Marking on ground or pavement surface the alignment and extent of the proposed facilities and the probable location of existing utilities using construction plans and existing surface features.

2. Requesting Underground Service Alert (USA) to indicate location of existing buried facilities (phone 1-800-642-2444). Provide USA a minimum of two (2) working days notice of request for locations, and notify Owner of said request concurrently.

3. Locate exact location of existing utilities by hand methods of excavation, or by use of vacuum equipment.

E. At proposed work location, expose by hand methods (or vacuum equipment) all existing utilities along the route of the proposed work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand (or vacuum equipment) methods to locate all existing facilities as indicated on the plans, and/or as indicated on the ground by USA or Owner’s personnel.

F. Record the location of all utilities encountered. Where locational conflicts exist between existing utilities and the planned location of facilities to be constructed under the Contract, submit detailed information to the Owner’s Inspector for review and direction.

G. Maintain all existing utility mains and service lines in constant service during construction of the Work.
H. Where service disruptions are allowed, minimize the length of such disruptions by proper scheduling and diligent pursuit of the work.

1.8 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01 70 00.

B. Accurately record actual locations of utilities encountered.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fill in Turf or Other Planting Areas: Type S2 or S3 per Section 31 14 00.

B. Fill in Non-planting Areas: Type S1, S2 or S4 per Section 31 14 00.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions.

3.2 PREPARATION

A. Identify required lines, levels, contours and datum.

B. Locate, identify, and protect existing above and below grade utilities from damage.

C. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.

D. Protect existing structures, fences, curbs, sidewalks, paving and other improvements to remain from damage from excavation equipment and vehicular traffic.

E. Employ equipment and methods appropriate to the work site.

F. Protect excavated areas from drainage inflow, and provide for drainage of all excavated areas.

G. Comply with all provisions of the Construction Safety Orders and General Safety Orders of the California Division of Industrial Safety, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground in excavations.

3.3 EXCAVATION

A. In accordance with all technical specifications and requirements shown on drawings.

B. Excavate soil to finish subgrade of improvements (or layer thereof) to be placed thereon, or to finish surface grade where no improvements are to be placed thereon.

C. Conform excavation to the lines, grades and cross-sections shown on the plans.
D. When excavating through tree roots, perform work by hand and cut roots, where authorized, with a saw.

E. Remove excess soil not to be used as fill in the Work from the site. Unless requested by Owner to be deposited at a site designated by Owner on campus property, obtain a disposal site and legally dispose of said excess material, all at no additional cost to the Owner.

3.4 FILLING

A. In accordance with all technical specifications and requirements shown on drawings.

B. Clear all debris, vegetable matter and other deleterious material from areas to receive fill, per Section 31 11 00.

C. Compact existing ground to required relative compaction prior to placement of fill.

D. On existing slope areas steeper than 8 horizontal to 1 vertical, plow or scarify existing surface prior to filling to produce a bond with the material to be placed.

E. Place and compact soil fill to finish subgrade of improvements (or layer thereof) to be placed thereon, or to finish surface grade where no improvements are to be placed thereon.

F. Conform fill to the lines, grades and cross-sections shown on the plans.

G. Place fill materials in layers not exceeding 0.67 foot in uncompacted thickness, and compact in accordance with 31 20 00/3.5.

H. Maintain optimum moisture content of fill materials to attain required compaction density.

I. Fill materials to conform to 31 14 00/2.1.

J. Provide, at no additional cost to Owner, imported soil material conforming to Soil Type S3 per 31 14 00, as needed to attain finished grades of Work outside the limits of non-vegetative surface improvements.

K. Provide, at no additional cost to Owner, imported soil material conforming to Soil Type S4 per 31 14 00, as needed to attain finished subgrade of Work within the limits of non-vegetative surface improvements.

3.5 COMPACTING

A. In accordance with all technical specifications and requirements shown on drawings.

B. Utilize equipment which will not disturb or damage existing utilities and other improvements.

C. Maintain optimum moisture content of materials to attain required compaction density.
D. Compact in layers not exceeding 0.67 foot in uncompacted thickness.

E. Obtain minimum 95% relative compaction of soil in the upper most 24 inches of trench backfill for areas to receive concrete, asphalt-concrete, aggregate base, or other non-vegetative surface improvements. Compaction in other areas shall obtain 90% relative compaction.

F. Provide compaction testing for all Earthwork per specification section 01 45 23. Do not proceed with additional work in area of compaction until testing has been completed and approved by the testing laboratory and the owner.

3.6 PREPARATION OF SUBGRADE FOR SURFACE IMPROVEMENTS

A. In accordance with all technical specifications and requirements shown on drawings.

B. Where concrete, asphalt-concrete, aggregate base, or other non-vegetative surface improvements, or a layer of said surface improvements, are to be constructed on the soil surface, prepare the subgrade for said improvements in accordance with this section.

C. Blade or disk the soil to a depth of 6 inches, and remove and dispose of (off the project site) all rocks, hardpan chunks or otherwise unsuitable material over 2.5 inches in size.

D. Thoroughly mix, water, roll and compact to a relative compaction of no less than 95%.

E. Coordinate work with Owner’s personnel to ensure that campus irrigation practice and watering schedule does not result in the saturation of soils in the work area.

F. Prior to commencing construction of surface improvements, pass a test roller of size and weight as approved by the Owner over the subgrade to establish the extent of soft or spongy areas requiring repairs.

G. Repair completely, at no additional cost to the Owner, any soft, spongy, or otherwise unstable areas encountered in the subgrade, by either of the following methods:

1. Remove the material (to the extent and depth necessary to eliminate the condition) and replace it with acceptable materials in conformance with this section.

2. Utilize an alternate method, such as subgrade reinforcement utilizing a geotextile fabric, as may be recommended by a properly licensed civil or geotechnical engineer, whose services are engaged and paid for by the Contractor. Prior to the repair, obtain the approval of the owner for such alternate method.

H. Inasmuch as unstable areas are regularly encountered within the campus area, include in the amount bid for this project full compensation for the repairs described in 31 20 00/3.6F., assuming extensive areas of unstable conditions within the work area.

I. Conform finished subgrade surface to the lines, grades and cross-sections shown on the plans.
3.7 FINE GRADING

A. Fine grade all finished surfaces to the lines, grades and cross-sections shown on the plans, and to blend to hard surface improvements.

B. Make gradual grade changes. Blend slopes into level areas.

C. Rake and smooth all finished surfaces not to receive hard surface improvements.

3.8 TOLERANCES

A. Top surface of Subgrade for Non-Vegetative Surface Improvements or Layers Thereof: Plus or minus 0.02 foot from planned elevation.

B. Top surface of Subgrade for Vegetative Surface Improvements or for Bare Ground - Plus or minus 0.05 foot of planned elevation, or as required for finish surface to match adjacent improvements or ground.

3.9 FIELD QUALITY CONTROL

A. Field testing will be performed per owner’s requirements.

B. Compaction testing will be performed in accordance with ANSI/ASTM D1557.

C. If tests indicate work does not meet specified requirements, recompact, or remove and replace, and retest.

END OF SECTION