



**DESIGN & CONSTRUCTION GUIDELINES**

**DIVISION 31 EARTHWORKS**

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**SECTION 31 05 00 EARTHWORK****1.1 SITE GRADING**

- A. Rough Grading: Slopes shall not be steeper than one (1) vertical to five (5) horizontal in general open lawn and other grassed areas. Steeper slopes will be permitted only on a case-by-case basis where special need warrants. Tops and bottoms of banks and other break points shall be rounded to provide smooth and graceful transitions. In areas of walks without ramps, slopes shall not be steeper than one (1) vertical to twenty (20) horizontal. Ensure ramped areas comply with the requirements of the Americans with Disability Act (ADA) and Florida Accessibility Code, and meet the intent of the FBC, Chapter 468.
- B. Finish Grading: This operation shall consist of the final dressing to provide a uniform layer of the topsoil and/or nutrients required under Section 32 90 00, Landscaping for the placement of plant materials or of the subgrade in preparation of pavement construction. This work shall achieve elevations within 0.1 inch of required elevation so that the proper thicknesses of overlayers can be provided.

**1.2 EXCAVATING AND BACKFILL****A. EXCAVATING**

1. General for Site: Excavation is to be unclassified and is to be performed as authorized excavation regardless of type, nature or condition of the material encountered as necessary to establish the lines and grades to be shown on the drawings. Once subgrade elevations have been reached, Architect/Engineer (A/E) is to inspect and determine suitability of subgrade material for intended purpose. If unsuitable, additional excavation can proceed the same as authorized and paid for at the same unit price established in the bid. It is to be stipulated that excavations beyond the limits needed to establish required grades without the specific direction of the A/E will be regarded as unauthorized.
  - a. Unauthorized excavations and any required remedial work will be at the contractor's expense.
  - b. Excess excavation and material not suitable for backfill and embankment operations shall be removed from the University with the exception that the University reserves the right to select and claim up to the first 2,000 cubic yards. It is to be stipulated that the contractor shall deposit said material, if owner elects, to a location on the campus designated by the Owner at no additional cost. Provisions for maintaining workmen safety within excavations is the sole responsibility of the Contractor.
2. Trenching: Trench excavations shall be the same as that for general site excavation except that width shall be only to the extent normal for the utility system being installed. A/E is to define normal trench widths and restoration limits paid for with appropriate details in the plans. For excavation beyond normal widths, A/E is to define special backfill requirements at contractor's expense. Trenching shall establish bottoms to the required lines and grades such that proper bedding of the utility can be accomplished in accordance with the material manufacturer's recommendations. All trench bottoms are to be maintained dry until properly backfilled and compacted.
  - a. A/E is to ensure all applicable safety codes/regulations are followed for sheeting, shoring and side slope requirements. Trench excavations shall be guarded at all times. It is to be stipulated that if trenches are to be left open while unattended for any reason, or beyond work hours, they shall be barricaded with high visibility yellow safety net staked with 2 X 4 posts (and 2 X 4 top rail at edges of, or crossing sidewalks) 4 feet from the trench edges.

**B. BACKFILL**

1. General for Site and Structures: A non-plastic, clean, granular material composed of sand, fractured rock or gravel obtained from the excavation activities or, if necessary, from offsite borrow shall be provided. The material shall be substantially free of clays, organics including loam, peats and wooden materials and trash, which may be compressible. Quality backfill shall also be void of masonry, rubble and roadway products. Blending of admixtures to improve gradation uniformity and stability is permissible. Provide laboratory verification that intended backfill materials are suitable for the intended purpose. Backfill

materials shall be generally placed in 12 inches maximum lifts, loose measure. Specify thinner lifts under structures, pads and pavements as appropriate.

2. Trenches: Specify select backfill material of equal quality or better stipulated for general site. Initial placement of material in trenches should be limited to 6-inch lifts to ensure that adequate compaction and support is achieved under the haunches of the pipe to the springline. Placement should then proceed in 6 inches lifts to facilitate proper compaction to 1 foot above the pipe. The remainder of the trench can usually be backfilled and amply compacted in 12 inches lifts. However, the ability to achieve density requirements must be maintained.

### 1.3 EXCESS MATERIAL DISPOSAL

- A. Excess excavation, backfill, and other construction wastes shall be disposed of off campus to a site secured by the contractor. No on-site burning or burying of wastes will be permitted and no additional cost to the Owner for disposal is to be charged. Excess earth materials not needed for other work shall not be stockpiled temporarily on the site and construction rubble and debris shall be placed in Contractor supplied dumpsters to be picked up on regular intervals. Reference is made to [Section 32 05 00, Subparagraph 1.2.B, Backfill](#) for Owner's first option to excess quality fill materials.

### 1.4 SOIL COMPACTION

- A. Quality control testing is to be provided to ensure that fill materials are properly placed and compacted to yield the necessary densities for the support capabilities needed. The A/E is to determine the testing program suitable for the work to be pursued and make recommendation to the Owner. A/E is to assist Owner in selecting a qualified testing laboratory to perform the testing activities and evaluation of the contractor's work. The Owner will pay for all initial tests conducted. It is to be stipulated that where tests indicate work fails to meet the requirements specified, the contractor, at his expense, shall perform remedial work and retest to verify that the material placement meets the specification requirements.
- B. Compaction Requirements: Specify that soil compaction be evaluated based on the densities determined by Standard Proctor Tests.
  1. General Site: Cuts and embankments not intended to support subsequent work or structures should be compacted to a firmness equal to the adjacent undisturbed soils. See [Section 32 90 00, Landscaping](#), for further direction on like areas.
  2. Under Structures: Soil preparations intended to support site related structures shall be compacted to a density of at least 100% of the maximum laboratory density as determined by [American Association of State Highway and Transportation Officials \(AASHTO\) T-99](#). Compaction under building foundations and structures shall achieve the density requirements established in the geotechnical evaluations and recommendations.
  3. Utility Trenches: Compaction of trench backfill shall achieve the density as stipulated for site structures in [Section 31 05 00, Subparagraph.1.4.B.2](#) above.
  4. Pavements: Areas subject to vehicular traffic shall be prepared in accordance with the provisions of the [Florida Department of Transportation \(FDOT\) Standard Specifications for Road and Bridge Construction](#), latest edition. Densities to be achieved shall be at least 98% of the maximum density as determined by [AASHTO T-180](#).

### 1.5 SOIL TREATMENT

- A. Provide soil treatment for termite control under all sides of foundation walls, building slabs on grade, and sidewalks that adjoin new or existing buildings.
- B. Ensure applicator is a professional pest control operator licensed in the State of Florida in accordance with all applicable regulations governing the application of soil treatment solutions.
- C. Treatment materials applied shall be [Environmental Protection Agency \(EPA\)](#) approved for the application of effective termite control. The product shall be applied in accordance with the manufacturer's recommendations and the technical data and application instructions are to be submitted to the Owner prior to commencing. Ensure that the soil treatment is not applied until all excavation, filling, compacting, and grading operations are complete in the areas to be treated.

- D. Treatment warranty shall be for a period of not less than five (5) years from the date applied. A/E is to ensure warranty includes provisions for re-treatment and repair or replacement of any damage caused by infestation or evidence of infestation within the warranty period without cost to the Owner or his successor or assigns.

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END OF SECTION 31 00 00

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**SECTION 31 10 00 SITE CLEARING****1.1 CLEARING THE SITE**

- A. All objectionable growth within the site area planned for building and landscaping improvements shall be cleared. All debris resulting from any clearing, stripping, grubbing, and demolition activities shall be removed from the Campus at frequent intervals to prevent unsightly accumulation.
1. Protection of Trees: Trees designated to remain shall be documented on the plans and tagged in the field. The contractor is to be responsible for protecting the top, trunk, and root system of these trees. Protection shall be by barricading with 4 X 4 posts with 2 X 4 rails (minimum 2 rails per side), installed at the drip line of the tree. No equipment, stockpiling of materials, work or parking is to be permitted within the barricades. Root zones shall be protected, where determined by an arborist or USF Landscape Architect, as necessary by root pruning at outside edge of barricades.
  2. Stripping: Remove all organics, grasses, roots and topsoil to its full depth to the limits of the areas to be graded. Topsoil free of tree roots, brush and other debris can be stockpiled within the site for subsequent landscaping needs. All material in excess of subsequent needs shall be removed from the campus.

**1.2 GRUBBING**

- A. The removal of trees and shrubs shall include the removal of stumps and roots. No stump or root greater than 3 inches in diameter shall remain in the areas where underground structures, utility lines, footings and pavements are to be constructed. Grubbing in open areas shall remove stumps and roots greater than 3 inches in diameter to a depth of 2 feet below finished grade.

**1.3 DEMOLITION**

- A. Structural: Structures to be abandoned along with their foundations shall be removed to a minimum depth of 1 foot below bottom of new foundation work. Where such is to occur at locations of proposed new structures, A/E is to define the extent of foundation removal on the drawings. If any slab is to remain under fill for new structures, it is to be broken to facilitate groundwater percolation.
- B. Selective Removal
1. Asbestos: The University may assume the responsibility for asbestos abatement prior to building renovations, or it may be made a part of the construction contract. However if asbestos is encountered as the work progresses, the work must stop in the immediate area until properly abated. Specific reference is made to [Appendix A, Section 4, Asbestos Survey & Abatement](#). The Contractor shall give notice of such occurrence to the USF FM-Design & Construction (FM-DC) Project Manager and the USF FM-Environmental Health & Safety (FM-EHS).
  2. Re-locatable Items: A/E is to ensure that special concern is given equipment that is to be removed, relocated, and reinstalled. The work shall be clearly defined in the plans to direct the contractor to:
    - a. Disconnect and move to new location(s).
    - b. Restore, remove, and/or cap utilities at old location(s).
    - c. Schedule work with USF FM to minimize hardship from any outage. USF PM will coordinate and shall be given 2 weeks notice.
    - d. Include in base price scope any and all new piping, valves, fittings, ductwork, and wiring necessary for a complete and satisfactorily working reinstallation.

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END OF SECTION 31 10 00

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**SECTION 31 60 00 FOUNDATION****1.1 FOUNDATION TYPES**

- A. The University's building construction has experienced a wide array of foundation systems to address the various soil and subsurface conditions for cost effective support of the building loads. These systems comprise spread footing, grade beams, mat foundations, precast driven piles, and auger cast piles. No wooden pile systems are allowed except in appropriate marine applications.
1. Use of stone vibratory columns in proximity of USF water wells is prohibited; review and approval of the USF Civil Engineer and the Building Official is required for consideration of stone vibratory columns on campus.
  2. Use of vibratory sheet piling in proximity of building structure, buried utilities and parking & roadways require the USF Civil Engineer and the Building Official review & approval.

**1.2 DESIGN**

- A. As part of basic services, the A/E is to provide the foundation system design. The design shall be conducted by a Professional Engineer, registered in the State of Florida, experienced and actively engaged in the practice of Structural Engineering Design. The drawings shall bear the seal and signature of this Engineer.
- B. The A/E, along with his structural consultant, shall determine the best-suited foundation system for the building. This determination shall be based on a review and consideration of the subsurface geotechnical reports, foundation systems of adjacent buildings, and potential adverse impacts on neighboring structures imposed by foundation systems installation. Further reference is made to [Section 02 06 00, Subparagraph 1.2](#).

**1.3 LABORATORY SERVICES**

- A. An independent laboratory shall be employed through the A/E Additional Services provisions to perform quality control testing of the foundation system installation. The laboratory, in cooperation with the A/E and A/E's consultant, shall develop the testing program with costs and make recommendations to the Owner. The testing program shall include continuous inspection services where needed, such as the case of pile driving work.

**1.4 PAYMENTS**

- A. Payments for Laboratory Services: The testing laboratory shall be responsible to the A/E, as Additional Service. The Owner will pay all first time costs for the tests and analysis performed from the project funds. The A/E is to present the invoices to the Owner for actual costs without fee mark-up. Invoices are to reference the specific tests performed and the deliverables presented, such as field reports. Copies of the field reports are to be submitted to the A/E, responsible contractor, and the Owner prior to invoicing for those specific services.
- B. Payment for Foundation Systems:
1. Payment for mat, spread footings, and grade beam systems shall be a lump sum as part of the base bid.
  2. Payment for subsurface grouting and piling work shall be on a unit cost basis. A base bid amount shall be provided based on a predetermined estimated quantity. The specifications shall state that the predetermined amounts are based on the piling depths and/or grout quantities shown on the drawings and/or soil reports. The proposal form, in addition to lump sum amounts, shall make provisions for per linear foot costs for piling and cubic yard costs for grouting to be added to, or deducted from, the base bid for quantities differing from those predicted. The specifications are also to stipulate that no payment will be made to the contractor for extra work performed for his own use. The specifications shall define the method of calculating the adjusted costs for actual work performed. In the case of driven piles, provisions shall also be included for defining and determining the costs for pile splices, if required. The methods of calculating the actual costs shall be formulated in the best interest of the University, particularly with regard to receiving full value for deleted work.

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END OF SECTION 31 60 00