

PART FIVE DOCUMENTS FOR SITE AND INFRASTRUCTURE

DIVISION 31 – EARTHWORK

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31 00 00. EARTHWORK

31 10 00. SITE CLEARING

- .1 STRUCTURE REMOVAL: Include structure removal in DIVISION 02, Section 02 41 00 DEMOLITION.
- .2 EXPLOSIVES: Use of explosives or blasting as a construction practice is prohibited, except when approved in writing by the University Architect for special cases.

31 11 00. CLEARING AND GRUBBING

- .1 CLEARING: All objectionable growth shall be stripped. Debris resulting from stripping and clearing operations shall be promptly removed from University property so as to prevent this material from accumulating on the site.
- .2 GRUBBING: Removal of trees and shrubs shall include the removal of stumps and roots to the extent that no root greater than 3 inches in diameter remains within 5 feet of an underground structure or utility line or under footings or paved areas. Grubbing in open areas shall include removal of stumps and 3 inch roots to 2 feet below finish grade elevations.
- .3 PROTECTION OF TREES: Existing trees indicated to remain shall be protected by boxing. Boxing shall be 4 by 4 inch posts with two 2 by 4 inch rails, approximately 8 by 8 feet centered on tree trunk, to a height of approximately 5 feet. Some specimens will require fencing at the drip line of the branches. Do not store anything within the drip line of any trees.
- .4 PROTECTION OF SPECIAL TREES AND SHRUBS: Trees and shrubs are of such value that special attention of the contractor must be directed to protection for them. Roads and Grounds and/or the University Landscape Architect shall be consulted by project specific document notes and details for protection of trees. A monetary value has been assigned to every tree on OSU property. The contractor will pay the listed value for any tree that dies as a result of the construction process. Consult the University Architect for current tree values.
 - .4.1 Occasionally, protection of a specimen will require fencing at the drip line of the branches; or, if the specimen is in danger from objects falling on it, a sturdy roof over the tree or shrub may be required.

31 22 00. GRADING

- .1 ROUGH GRADING: Slopes shall not be greater than 1 vertical to 3 horizontal in grassed areas. Steeper slopes will be permitted only in areas where groundcover planting is planned or with the special permission of the University Landscape Architect.

NOTE: *Paragraph on Topsoil Placement and Finish Grading moved to DIVISION 32 EXTERIOR IMPROVEMENTS, Section 32 91 00.*

31 23 00. EXCAVATION AND FILL:

- .1 MATERIALS FOR FILL AND BACKFILL: Specify only materials which can be compacted, without containment, to the densities specified by the project engineer.
- .2 SOIL COMPACTION CONTROL: Compaction control shall be provided for all fill, backfill, and embankments, both inside and outside the perimeter of the structure. Field compaction tests and related laboratory analyses shall be performed by a qualified independent laboratory (a member of the American Society for Testing and Materials), under the supervision of a registered professional engineer specializing in soils engineering. Soils proposed for fill, backfill, and embankments shall be analyzed by the soils engineer to determine acceptability; no soil shall be placed until it is approved by the soils engineer. A representative of the testing laboratory shall provide continuous inspection during placement and compaction operations; tests shall be made in a quantity that will assure uniform compaction and density of each course, or lift, of fill.
- .3 PAYMENT FOR LABORATORY SERVICES: The testing laboratory shall be made responsible to the Associate Architect. All costs for tests and analyses performed shall be paid from Project Funds on an actual cost basis without fee mark-up. The testing laboratory shall be made responsible to the associate. Written reports of field tests shall be submitted directly to the Associate, the responsible contractor and the University Architect.
- .4 COMPACTION REQUIREMENTS: Specify that soils be compacted to the following densities, as determined by Standard Proctor Tests:
 - .4.1 ROAD BEDS: Compaction shall conform to requirements specified in the latest edition of the City of Columbus, Ohio Construction and Material Specifications, Item 203 for all work within Franklin County and the State of Ohio, Department of Transportation Construction and Material Specifications, Item 203 for work outside of Franklin County. Compaction is required for the entire subgrade area for the full width and depth of slope of the embankment supporting the berm and pavement.
 - .4.2 INSIDE STRUCTURES:
 - .4.2.1 UNDER NON-STRUCTURAL SLABS ON GRADE, with normal loading: 98 percent, standard Proctor test procedures (ASTM D-698).
 - .4.2.2 UNDER SPECIAL FOUNDATIONS, ISOLATED PADS, AND FOOTINGS: 100 percent, standard Proctor test procedures (ASTM D-698).
 - .4.3 OUTSIDE THE STRUCTURES:
 - .4.3.1 TRENCH COMPACTION Under paved surfaces shall be as described below except that shallow trenches shall be filled with flowable controlled density fill (FCDF) per City of Columbus specifications 636 and topped with 3 inches of City of Columbus Item 415. Deep large volume trenches under paved surfaces shall be benched 12" back from the face of the excavated trench and filled and compacted as described below and at least the top 15 to 18 inches of trench shall be filled with 12 inches of material control density fill and topped with 3 inches of City of Columbus Item 415.

31 23 00. EXCAVATION AND FILL: (Cont'd)

.4 COMPACTION REQUIREMENTS: (Cont'd)

.4.3.2 PARKING AREAS: The top 1 foot of subgrade shall be compacted to 100 percent of maximum dry density.

Remainder:

Maximum Laboratory Dry Weight (lbs./cu. ft.)	Minimum Compaction Percent of Laboratory Maximum
90.0 - 104.9	100
105.0 - 119.9	98
120.0 and more	96

.4.3.3 FOUNDATION BACKFILL UNDER PLANTING BEDS AND LAWN: The upper 2 feet of soil below finish grade - 92 percent maximum. Remainder of backfill - 95 percent if depth is less than 10 feet; - 100 percent if depth exceeds 10 feet.

.4.3.4 FOUNDATION BACKFILL UNDER PAVEMENTS: 100 percent, standard Proctor test (ASTM D-698).

.4.3.5 UNDER PAVED PEDESTRIAN WALKS AND COURTS: 98 percent, standard Proctor test (ASTM D-698).

Specify that extreme care be exercised to obtain proper compaction under edges of walks which abut walls, stairs, curbs, adjacent slabs, and other structures where use of mechanical compactors is made difficult.

.4.3.6 BACKFILL AROUND MANHOLES AND OTHER UNDER-GROUND STRUCTURES: 98 percent if depth is less than 10 feet; 100 percent if depth is more than 10 feet.

.4.3.7 UNDER LAWN AND PLANTING AREAS WHICH ARE NOT ADJACENT TO STRUCTURES: The upper 1 foot of soil below finish grade - 92 percent maximum. Remainder - 95 percent.

.4.3.8 DENSITY OF TRENCH BACKFILL shall be equal to densities specified for all adjacent fill and backfill.

.5 DISPOSAL OF EXCESS: Excess fill material or topsoil which is not required nor permitted as fill shall be removed from University property at the contractor's expense.

31 25 00. EROSION AND SEDIMENTATION CONTROLS

.1 TEMPORARY SEDIMENT AND EROSION CONTROLS

.1.1 Reference the City of Columbus (COC) Construction and Material Specifications Item 207 for temporary sediment and erosion control materials and requirements for work within Franklin County. Reference local codes or the State of Ohio Department of Transportation (ODOT) Construction and Material Specifications Item 207 for work outside Franklin County, whichever is more stringent.

.1.2 Inspect, repair, and clean erosion control blankets after each rain event.

31 60 00. SPECIAL FOUNDATIONS AND LOAD-BEARING ELEMENTS

- .1 TYPES OF FOUNDATIONS: The Associate, in consultation with his structural consultant, shall determine the type of foundation best suited for the structure, as indicated by soil conditions and other conditions at the site. Before a decision is made to use pile foundations, the Associate shall make a thorough examination of structures and occupancies adjacent to the site to determine what effect vibratory forces will have on such structures, occupancies and equipment. At the Associate's option, foundations may be a system of precast or cast-in-place concrete piles, steel piles, concrete caissons, or a combination of piles and caissons. Wood piles are prohibited.
- .2 DESIGN: Design shall be by a professional engineer, registered in the State of Ohio, and drawings shall bear the seal and signature of the engineer.
- .3 LABORATORY SERVICES: An independent laboratory shall be employed to devise tests, in cooperation with the associate's consultant, to perform testing of piles and to provide continuous inspection of pile driving and caisson construction to assure conformance with the drawings and specifications.
- .3.1 PAYMENT FOR LABORATORY services shall be as specified for soil compaction control in paragraph 31 23 00.2.
- .3.2 TEST PILES: Specify that the laboratory, in cooperation with the consultant, locate piles and employ the contractor to drive a minimum of 3 test piles before any other pile driving is started. Location of piles shall be such that, if tested piling meets requirements specified, these piles may be used in the building foundation system.
- .3.3 TEST REPORTS FOR ALL PILES SHALL INCLUDE: Date of driving; locations; grade designation and dimensions of pile; pile point reinforcement and description, if any; total penetration; starting and finishing times, and total driving time; number of blows required for each foot of penetration, total number of blows, and resistance in blows per inch for the last 6 inches of driving. Include a record of driving equipment used: hammer make and model number, stroke, weight of ram, and rated driving energy, driving cap weight and description, actual rate of operation of hammer during driving.
- .4 PAYMENT: Specifications shall contain statements that the base bid price for the work be based on depths of piles, or caissons, as shown on the drawings and on soil boring data. The Bid Form shall contain spaces for amount per linear foot to be added to or deducted from base bid for depths differing from those indicated. A statement must be made that payment to the contractor will not be made for extra pilings which are driven for his own use while conducting the work. The associate must certify the depths of pilings, or caissons, upon which the contractor's cost is based. A statement must also be made about the method of calculating the adjusted cost for pilings actually driven. Method of calculation should be that which is least expensive for the University since bidders usually indicate lower amounts for deducted than for added footage.

31 63 26. DRILLED CAISSONS

- .1 INSPECTIONS: The testing laboratory and the Associate's consultant shall make continuous inspections of all operations during excavation, casing installation, and placement of concrete.

31 63 26. DRILLED CAISSONS (Cont'd)

- .2 DATA REPORTS SHALL INCLUDE: Date; weather; time; identification mark; shaft diameter; bell diameter; top elevation; bottom elevation; bearing strata description; nature and location of obstructions; and water conditions during drilling and concrete placement.

END OF DIVISION 31 - EARTHWORK