

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. Clearing exercises on Columbus Campuses shall follow City of Columbus Item 201. Clearing exercises on Regional Campuses shall follow ODOT Item 201.
- .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. Grubbing exercises on Columbus Campus shall follow City of Columbus Item 201. Grubbing exercises on Regional Campuses shall follow ODOT Item 201. Any removed tree with a bole of 12" or greater shall be disposed of using the Sustainable Wood Initiative (https://fod.osu.edu/sites/default/files/wood_recovery.pdf).
- .3 PROTECTION OF TREES: Existing trees indicated to remain, or where local permit requirements warrant them to remain, shall be protected by boxing. Boxing shall be 4 inch by 4 inch posts with two 2 inch by 4 inch rails, approximately 8 feet by 8 feet centered on the 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. Protection of Trees on Columbus Campus shall follow Columbus Item 655.
- .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. The University Landscape Architect shall be consulted by project specific document notes and details for protection of trees. Tree Heritage Guidelines shall be followed (https://fod.osu.edu/sites/default/files/heritage_specimen.pdf). A monetary value has been assigned to every tree on The Ohio State University property. The contractor will pay the listed value for any tree that dies as a result of the construction process. Consult the University Landscape Architect for current tree values. Protection of Trees on Columbus Campus shall follow Columbus Item 655.

- .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 Unless otherwise specified by these standards and regulations, all site grading shall be designed to meet the following standards:
 - .1.1. Planting/Lawn Areas
 - a. Minimum Slope: 2%
 - b. Maximum Slope: 33%
 - .1.2. Parking Lot Pavement
 - a. Minimum Slope: 1.5%
 - b. Maximum Slope: 4%
 - .1.3. Pedestrian Plaza Areas
 - a. Minimum Slope: 1%
 - b. Maximum Slope: 2.5%

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 Architect/Engineer (A/E).
 - .1.1 Common Fill (Subsoil): Excavated material, graded free of:
 - .1.1.1 Lumps larger than 6 inches.
 - .1.1.2 Rocks larger than 3 inches.
 - .1.2 Select (Premium) Bed and Fill Materials:
 - .1.2.1 Aggregate Base: Crushed stone or Gravel. Angular, crushed or washed natural stone. Free of shale, clay friable materials, and debris. Complying with ODOT CMS Item 304. Graded within the following limits (slag will not be allowed):



Sieve Size	Percent Passing
2 Inches	100
1 Inch	70 to 100
3/4 Inch	50 to 90
No. 4	30 to 60
No. 30	9 to 33
No. 200	0 to 15

.1.2.2 Coarse Interlocking Aggregate: Natural stone. Free of clay, shale, and organic matter. Complying with the material requirements of ODOT CMS Item 703. Slag will not be allowed. Coarse aggregate shall be of size number 6, 67, 68, 7, 78, or 8, and graded in accordance with ODOT CMS Table 703-1.

.1.2.3 Low Strength Mortar Backfill: A flow-able fill composed of a Portland cement, fly ash, and/or sand mixture, in accordance with ODOT CMS Item 613.

.1.2.4 Sand: Natural river or band sand. Washed, free of silt, clay, loam, friable or soluble materials, and organic matter. Graded in accordance with ASTM C-136 within the following limits:

Sieve Size	Percent Passing
No. 4	100
No. 14	10 to 100
No. 50	5 to 90
No. 100	4 to 30
No. 200	0

- .2 DEWATERING: Where existing high water tables are encountered, a dewatering system shall be provided that effectively reduces the hydrostatic pressure and lowers the groundwater levels below excavation levels as required for safe and proper execution of the work.
- .3 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.



- .3.1 UTILITY TRENCH: Minimum utility trench cut width shall be 2' to allow for proper compaction. A/E shall show a detail of utility trench cut with the minimum width of cut being called out on the plans or make reference to City of Columbus Standard Drawing 1441 DR.A "Pavement & Utility Cut Repair Standards".

- .4 PAYMENT FOR LABORATORY SERVICES: The testing laboratory shall be made responsible to the A/E. 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 A/E. Written reports of field tests shall be submitted directly to the A/E, the responsible contractor and the University Project Manager.

- .5 COMPACTION REQUIREMENTS: Specify that soils be compacted to the following densities, as determined by modified Proctor Tests:
 - .5.1 ROAD BEDS: Compaction shall conform to requirements specified in the latest edition of the City of Columbus, Ohio Construction and Material Specifications, Item 204 for all work within Franklin County and the State of Ohio, Department of Transportation Construction and Material Specifications, Item 204 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.

 - .5.2 INSIDE STRUCTURES:
 - .5.2.1 UNDER NON-STRUCTURAL SLABS ON GRADE, with normal loading: 95 percent, modified Proctor test procedures (ASTM D-1557).

 - .5.2.2 UNDER SPECIAL FOUNDATIONS, ISOLATED PADS, AND FOOTINGS: 100 percent, modified Proctor test procedures (ASTM D-1557).

 - .5.3 OUTSIDE THE STRUCTURES:
 - .5.3.1 TRENCH COMPACTION Under paved surfaces shall be as described below except that shallow trenches shall be filled with low strength mortar (LSM) per City of Columbus and ODOT specifications 613 and topped with 3 inches of City of Columbus Item 404. 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 and ODOT Item 401.



.5.3.2 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	102
105.0 - 119.9	100
120.0 and more	98

.5.3.3 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.

.5.3.4 FOUNDATION BACKFILL UNDER PAVEMENTS: 95 percent, modified Proctor test (ASTM D-1557).

.5.3.5 UNDER PAVED PEDESTRIAN WALKS AND COURTS: 95 percent, modified Proctor test (ASTM D-1557).

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.

.5.3.6 BACKFILL AROUND MANHOLES AND OTHER UNDERGROUND STRUCTURES: 98 percent if depth is less than 10 feet; 100 percent if depth is more than 10 feet.

.5.3.7 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. Exception shall be taken for the areas designed as storm water best management practices (BMPs) which may have different compaction requirements.

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

.6 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 (See ODOT Construction and Material Specifications) 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:** Wood piles, helical piers and push piers shall only be used with permission from the University Engineer.

END OF DIVISION 31 - EARTHWORK