

SECTION 31 23 00

EXCAVATION AND FILL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract and Division One and other related specification sections apply to work of this section.

1.02 REGULATORY REQUIREMENTS

- A. Burning will not be allowed on-site. Comply with all applicable codes, regulations, and laws.
- B. Comply with applicable requirements of CABO/ANSI A117.1 for accessibility requirements related to walks, ramps, parking areas, drives, curb ramps, etc.
- C. Obtain and comply with all requirements of the City of Denver and CDPHE Stormwater and/or Groundwater Discharge Permits, as required.
- D. For public improvements only, in the event of a conflict between municipal standards and this specification, municipal standards for products and installation will govern.
- E. Excavation work shall be performed in compliance with City of Denver and current OSHA requirements.

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Protect adjacent structures and surrounding areas from damage during excavation, filling, and backfilling.
- B. Protect work from erosion or other similar types of damage until the project has been accepted. Leave protection in place for building contractors use.
- C. Do not backfill or construct fills during freezing weather. Backfill or construct fills only when temperature is 35°F and rising.
- D. Do not use frozen materials, snow, or ice in any backfill or fill area.
- E. Do not backfill or construct fill on frozen surfaces.
- F. Protect excavated material from becoming frozen.
- G. Do not remove trees from outside excavation or fill areas unless authorized by the Owner; protect from permanent damage by construction activities.
- H. Provide temporary bridges for roadways, walkways, driveways, etc.

1.04 QUALITY ASSURANCE

- A. All imported material to be free of hazardous and organic wastes, “clean” as defined by EPA, and approved for its intended use by the Owner or project geotechnical engineer.

1.05 WARRANTY

- A. Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment or site furnishing. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.
- B. The term of warranty will be 24 months.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Submit all materials in accordance with Section 01 33 00, Submittals.
- B. General backfill quality:
 - 1. Specify acceptable and unacceptable soil classifications for each type of soil backfill material.

2. Specify pipe bedding materials, both inside and outside the building.
 3. Pipe bedding materials should include crushed aggregate that has bridging qualities which will reduce “ovalling” and low spots in gravity flow systems.
 4. Free of brush, sod, organic material, vegetative matter, debris and other deleterious substances.
 5. Shall not contain rocks or lumps having a diameter of more than 2 inches.
 6. Free of frozen material.
 7. The use of acceptable on site soils should be prioritized above other options.
- C. Structural Fill:
1. In conformance with recommendations of Geotechnical Report.
 2. If no Geotechnical Report is provided for the project use the following minimum criteria:
 - a) Imported structural fill, such as ½ inch minus, CDOT Class 7 Aggregate Road Base conforming to the following:
 - i) Gradation: 1 inch – 100% Passing, No. 8 Sieve – 20-85% Passing, No. 20 Sieve – 20% maximum.
 - ii) Liquid Limit: 35 maximum.
 - iii) Plasticity Index: 15 maximum.
 - iv) R Value: 50 minimum.
- D. Non-structural Fill:
1. Non-structural fill material includes all fill not supporting structures or site paving and approved by the Owner’s Testing Agency.
 2. Granular, non-expansive material suitable for specified compaction, as approved by the Geotechnical Engineer.
- E. Geo-grid materials as specified by the geotechnical or civil engineer:
1. Alternate geo-textile or geo-grid materials not conforming to Geotechnical Engineers recommendations, require written approval from Owner’s Testing Agency prior to use.
- F. Flow Fill:
1. Where excavations are required inside of a building or other structure and within 2 feet of the exterior wall or footings, the Contractor shall use flowable concrete fill having a 28-day compressive strength of not less than 60 psi.

PART 3 EXECUTION

3.01 PREPARATION

- A. Stockpile topsoil to location specified by Construction Documents and coordinated with DPS.
- B. Stockpile other materials, in an approved location and manner, as indicated to be salvaged and reused (such as squeegee and sod).
- C. Remove debris and organic matter and dispose of legally off-site.
- D. Utility warning tape: Refer to standard Section 33 00 00, Utilities.

3.02 ZONSTRUCTION

- A. General
 1. Contractor to verify quantities of cuts and fills and perform all earthwork required to meet the grades as shown on the plans, including but not limited to, additional import or export required to handle compaction, building and pavement subgrade preparation, and pipe bedding.
 2. Perform work in a safe and proper manner with appropriate precautions against hazard.
 3. Provide adequate working space and clearances for work performed within excavations and for installation and removal of utilities

4. Contain all construction activity on the designated site and within the limits of work. Cost of restoration off site will be the responsibility of the Contractor
- B. Excavation
1. Contractor shall be responsible for safety of excavations and for protection of existing buried utilities.
 2. Unauthorized excavation and remedial work shall be at the Contractor's expense.
- C. Backfill
1. Owner's Testing Agency must inspect and approve sub-grade prior to backfilling.
 2. Backfill only after the A/E's acceptance of below grade construction.
 3. Reference Geotechnical report for compaction under buildig and pavement
- D. Compaction
1. Compaction under landscaped or lawn areas shall be not less than 80% nor greater than 90% Standard Proctor within the top 18 inches of soil.
 2. Specify proof rolling for paving areas and slab pads and require that the Owner's Testing Agency witness the proof rolling.
- E. Dewatering
1. Dewatering of excavations is the responsibility of the contractor.

3.03 PROTECTION

- A. Field verify the location of all underground utilities, pipelines and structures prior to excavation.
- B. Sediment and erosion control: In no case shall construction activities commence without approved temporary erosion and sediment control measures in place.
- C. Property and environment: Contractor shall protect existing structures, appurtenances, trees and shrubs and their associated root systems. A warranty of 24 months shall be enforced to cover all excavation, backfill, and compaction sitework.
- D. Erosion and Sedimentation Control
1. Comply with Section 31 25 00 Erosion and Sedimentation Controls.
 2. Comply with City of Denver or other local MS4 Permit Requirements.
 3. Comply with City and County of Denver and Urban Drainage and Flood Control District standards for temporary grading, erosion and sedimentation control.

3.04 FIELD QUALITY CONTROL

- A. Notifications:
1. The Contractor shall notify the A/E and the DPS at least 10 working days prior to each phase of excavation, backfill, and compaction.
 2. Contractor shall work with the Owner to schedule Owner's inspections and testing.
- B. Information provided by Owner's consultants is not represented as sufficient to guarantee compliance with Contractor contract requirements. Contractor is responsible for his own testing to assure compliance with Contract Documents, at his own expense.
1. Contractor shall submit qualifications of the testing consultant, if different than Owner's Testing Agency, used for testing purposes on his own behalf.
 2. All additional information resulting from contractor testing shall be shared with the Owner and A/E.
- C. The Owner will retain the services of an Owner's Testing Agency for observation, testing, and quality control of work in this Section.
1. Frequency of testing (including subgrade under curb and gutter, trenches, footings, slabs-on-grade and other bearing surfaces), testing methods (include one sand cone for every ten nuclear tests for correlation),

- and by which method shall be developed in conjunction with the Owner's Testing Agency and approved by the DPS prior to inclusion into this specification section.
2. The Contractor shall supply location and elevation reference points for the use of the Testing Agency to locate the test points.
 3. The Contractor shall track test locations to verify that each lift has been compacted and tested in accordance with these specifications.
 4. Preliminary test reports from subsurface investigations will be provided to the Contractor from the Owner's Testing Agency.
- D. Contractor will be provided test and report information provided by the Owner's Geotechnical Engineer and Testing Agency.
- E. If additional testing/observation is needed, contractor shall obtain and pay for such services at his own expense.
- F. Final Grading:
1. After completion of all other outside work and after backfilling is completed and settled, bring to grade at the indicated elevations.
 2. Graders and other power equipment may be used for final grading and slope dressing if the result is uniform and equivalent to hand work.
 3. Grade all surfaces for effective drainage, provide a 2 percent minimum slope except as otherwise shown on the plans.
 4. Provide a smooth transition between adjacent existing grades and new grades.
 5. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
 6. Slope grades to direct water away from buildings and prevent ponds from forming where not intended.
 7. Finish subgrades at lawns and unpaved areas to required elevations within a tolerance of plus or minus one (1) inch.
 8. Coordinate final subgrade depth with finish landscape treatment.

END OF SECTION 31 23 00