

**GENERAL:**

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1. Subsurface Investigations
  - 1.1. The University will be responsible for providing record location information of the Owner's underground utility lines and structures.
  - 1.2. The Owner will assist with location of, but will not be responsible for location of, underground facilities owned by public utility, municipal corporation, or other persons.
2. Soils Investigations
  - 2.1. If investigative soils analysis is required during project design, Owner will retain a soils engineer.
  - 2.2. The soils engineer, in consultation with the Owner and consultant, will determine number, sizes, depth, and proposed location of borings and/or pits. In general, there will be one boring for every 2,000 square feet of building footprint, with a minimum of four soil borings. To the extent possible, borings should be located near the location of proposed footings/piers.
  - 2.3. Boring information will be shown, with dimensions, on a plot plan to be submitted in two (2) copies by the consultant to the Owner at least five (5) working days prior to proposed sampling.
  - 2.4. The plot plan will show:
    - 2.4.1. A graphic scale, north arrow, and location of existing buildings and trees
    - 2.4.2. Above and below ground service/utility lines (both utility company and Owner-owned lines)
    - 2.4.3. Pavement areas and established benchmark(s) with elevation(s) noted
    - 2.4.4. Existing site features, not specifically mentioned, impacting boring or pit locations.
    - 2.4.5. The soils/geotechnical report will be included as an informational item of the bidding documents in the general requirements, Division 1. **This document shall be clearly labeled as “For Information Only. This report is not a contract document”.**

**DESIGN GUIDELINES:**

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1. All activities will be contained within construction boundaries indicated on site plan. Specified excavation requirements, precautions, and protective systems will be observed at all times.
2. Movement of trucks and equipment on Owner's property will be in accordance with Owner's instructions.
3. Topsoil will be stripped from the construction site and stockpiled in designated area. At MU, topsoil will be stripped and disposed of legally off site.
4. Trenches will not be backfilled until all required tests are completed and the utility systems, as installed, conform to requirements specified by the contract documents.

5. Rock quantities anticipated to be removed in classified excavation as a part of the base bid will be either stated in Division 2 or on the bid form. Add/deduct unit prices for rock removal will be included on the Bid for Lump Sum Contract Form. Relatively accurate estimates of rock removal are important for defining accurate construction estimates.
6. For purposes of identifying and measuring rock, which may be encountered during classified excavation, the following definitions will be used. The definitions are based on minimum equipment requirements, which must be equaled or exceeded by the contractor. If the contractor chooses to use equipment of lesser size, capacity, or power than specified for excavating purposes, the contractor will assume all responsibility for the cost and method of removal of material resembling rock, which cannot be removed with their equipment. Therefore, contract unit prices submitted by the contractor for rock excavation will only be applicable if the contractor's equipment equals or exceeds equipment requirements specified below:
  - 6.1. Open Excavation
    - 6.1.1. Rock excavation in open excavations will include removal and disposal of any sound and solid mass, layer or ledge, regardless of origin, which cannot be effectively loosened or broken down in multiple passes in opposite directions.
    - 6.1.2. A late model crawler-type tractor rated with at least 170 net flywheel horsepower, equipped with a hydraulic ripper with one digging point of standard design and size, and with tractor operating in low gear.
  - 6.2. Pit and/or Trench Excavation
    - 6.2.1. Rock excavation in trenches and pits will include removal and disposal of any sound and solid mass, layer or ledge, regardless of origin, which cannot be excavated and removed by a 3/4 cubic yard capacity hydraulic backhoe, rated at not less than 90 net flywheel horsepower, and 30,000 pound drawbar pull.
  - 6.3. Drilled Pier Excavation
    - 6.3.1. Weathered rock/shale pier excavation is defined as any material that cannot be drilled or removed with conventional earth augers and requires the use of rock augers for drilling.
    - 6.3.2. Rock excavation is defined as any sound and solid mass, layer or ledge, regardless of origin, which cannot be drilled with conventional earth augers or underreaming tools and requires alternate drilling methods for removal, such as special core barrels, air tools, and/or other methods of rock excavation. (The minimum size drill rig is one with a rated positive crowd force of 37,000 pounds and a continuous torque rating of 25,000 foot pounds).
7. Disposal on Owner's designated site (use as directed by the Project Manager [PM]): contractor will remove excess suitable fill materials from project site and dispose of materials on the Owner's designated site. The distance contractor will have to haul materials for disposal will be in the contract documents. Contractor will level off fill materials at dump site. Unsuitable fill will be disposed of legally off the Owner's property.

8. Disposal off-site (use as directed by PM): contractor will remove excess suitable and unsuitable fill materials from project site and dispose of legally off the Owner's property.
9. Consultant will specify inspection and testing requirements and will include procedures for evaluation of test data. All bearing soil and backfill will be inspected and tested immediately prior to placement of reinforcing steel and concrete and at the discretion of the Owner's representative and the soils engineer. Owner will retain the services of an engineering inspection and testing firm. Contractor will be responsible for coordinating and scheduling inspections.
10. On MU projects, rough grade for the contractor will be 6" below finish grade. Topsoil and finish grading will be by the Owner.
11. Backfill and subgrade compaction will conform to geotechnical engineer recommendations. For projects without a geotechnical report, the following criteria shall be specified:
  - 11.1. Bearing soil for spread footings, pad footings, and slabs on grade shall be compacted to a minimum of 95% of maximum density at optimum moisture content (-2% to +4%) standard proctor. Excavation to undisturbed soils is not considered adequate.
  - 11.2. Backfill for foundations shall be compacted to a minimum of 88% and a maximum of 92% of maximum density under landscaped areas and a minimum of 95% of maximum density under other areas at optimum moisture content ( $\nabla$  2%) standard proctor. Backfill shall be installed in no more than 12" lifts. Specific soils or situations may require smaller lifts.
  - 11.3. Backfill for trenches should be well graded granular materials  $\frac{3}{4}$ " to 1" clean material vibrated in lifts.
12. Proof rolling shall be specified for areas to be paved and shall conform to the geotechnical engineer's recommendations. For projects without a geotechnical engineer's recommendation, the following criteria will be specified:
  - 12.1. All areas to be paved that are of sufficient size to permit the required equipment shall be proof rolled prior to placement of the aggregate base course. Proof rolling shall consist of passing/driving a loaded, 20-ton, tandem dump truck over the prepared subgrade soil with a maximum allowable displacement of 1". Any areas that displace more than 1" shall be compacted until this criterion is met, or those areas may be excavated and backfilled with compacted Type 1 Aggregate for Base. All proof rolling shall be performed in the presence of the Owner's Representative.