

SECTION 312000 - EARTHWORK - STRUCTURAL (WITHIN 5 FEET OF STRUCTURE)

PART1 – GENERAL

1.1 SUMMARY

- A. This Section specifies earthwork to occur within the perimeter of the structure footprint, including, but not necessarily limited to, footings, foundations, and slab base. All soil preparation shall be in accordance with these specifications and the Geotechnical Report by Whitaker Laboratory, Inc., dated November 19, 2015.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 2 Section Grading
 - 2. Division 2 Section Earthwork

1.2 BENCHMARKS

- A. Establish and maintain a minimum of two corresponding benchmarks on the site for references. All vertical dimensions shall be checked from these benchmarks.

1.3 FINISH GRADES

- A. Finished grades, as used herein, are the final grade elevations indicated on the drawings. Should finished grades shown on spot elevations conflict with those shown by the contours, the spot elevations shall govern.

1.4 BORROW PITS

- A. Submit representative samples of all fill material requiring compaction to the Designated Testing Laboratory. Material and borrow pits shall be approved by the Architect and Engineer prior to filling operations. If the quantity available from site grading is not sufficient, the purchasing, hauling, and blending of fill shall be done by the Contractor.

1.5 CONTROLLED FILL

- A. Class I Fill is all Structural Fill to the underside of slabs and to support foundations or footings and fill below finish grade immediately behind walls and in trenches and embankments under walks, drives, parking areas, and all areas to be paved.

1.6 DESIGNATED TESTING LABORATORY

- A. Designated Testing Laboratory shall be selected and paid by the Owner.
- B. Designated Testing Laboratory shall:

1. Witness proof rolling and make recommendations concerning undercutting and surface scarification.
2. Observe and make recommendations concerning surface drainage.
3. Perform Field Density Tests.
4. Provide advice concerning the selection of borrow soils.
5. Evaluate the suitability of the subgrade soils at the foundation bearing level as it relates to the geotechnical report for the project.
6. Submit daily testing reports to the Architect.
7. Perform observation of placement and compaction of structural fill.

1.7 COMPACTION TESTING

- A. Class I Fill: One Field Density Test (ASTM D2922 - Nuclear Method, D1556 – Sand Cone Method, or D2937 - Drive Cylinder Method) for each 2,500 SF of Structure Area after each 8 inch loose lift (unless noted otherwise in the Geotechnical Report) of fill with a minimum of 2 per lift; one auger and cone penetrometer test per 75 lineal feet of Grade Beam Subgrade. Provide one auger and cone penetrometer test, to a minimum depth of 5 feet if possible with groundwater and soil conditions, for every third Column Footing Subgrade as a minimum.

1.8 INSUFFICIENT FILL MATERIAL

- A. If the quantity of grading material is insufficient to provide finish grade elevations indicated on drawings, Contractor shall obtain additional fill material of specified quality off-site at no additional cost to Owner.

1.9 EXCESS CUT MATERIAL

- A. If the quantity of grading material is in excess of quantities to provide finish grade elevations indicated on drawings; any excess material shall be deposited off-site at no additional cost to the Owner.

PART 2 - MATERIAL

2.1 FILL MATERIAL UNDER STRUCTURE FOOTPRINT

- A. Sand Fill material shall consist of a clean sand with a fineness modulus of 1.6 to 3.1 and contain no more than 10% by weight finer than No. 200 U.S. Standard Sieve.
- B. Earth Fill material shall be free of organics, deleterious material, debris and rocks greater than 3 inches. Earth Fill shall be classified as GM, GC, GP, SM, SP, SW, SC or CL by ASTM D2487-85 Standard Methods for Classification of Soils for Engineering Purposes. Earth Fill shall also conform to the following:

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|----|-------------------------|-------------------|
| 1. | Liquid Limit | = 40 maximum |
| 2. | Plasticity Index | = 20 maximum |
| 3. | Dry Unit Weight Density | = 100 pcf minimum |

- C. Pervious Stone material shall consist of crushed stone or gravel. Size and gradation shall be as specified herein below:

<u>Total Percent Passing Sieve (By Weight):</u>							
Square Sieve	1-1/2"	1"	3/4"	2"	3/8"	#4	#8
	100	100	100	90-100	40-70	0-15	0-5

PART 3 - EXECUTION

3.1 SITE GRADING

- A. Contractor shall perform all filling, backfilling, cutting, and rough grading necessary to bring entire area both inside and outside of structures, and under floor slabs, to elevations indicated on the drawings.
- B. Finish grading outside of the structure, where not shown otherwise on the drawing, shall be given uniform slopes between points for which finished grades are shown, or between points and existing established grade.
- C. Provide drainage away from the structure, where not shown otherwise on the drawings, at a grade of at least 6 inches in 10 feet. Provide shallow swales where indicated on plans at a minimum width of 6 feet and a minimum depth of 3 inches with a minimum flowline grade of not less than 1/8 inch per foot. Provide rounding at top and bottom of banks and at other breaks in grade.
- D. Remove a minimum of 24 inches of soil below the granular aggregate base subgrade specified below the slab for the entire building site, including five feet beyond the building perimeter on all sides. Proof-roll this area under the direct supervision of the geotechnical engineer and remove and replace, as directed, any unsuitable material with Structural Fill. Follow the directions as specified in the soils report and as directed by the geotechnical engineer in all cases.
- E. Do not drain downspouts adjacent to footings.

3.2 RAINWATER, SURFACE WATER, AND BACK-UP

- A. Protect all work, including excavations and trenches, from rainwater, surface water, and back-up of drains and sewers. Furnish all labor, pumps, shoring, enclosures, and equipment necessary to protect and to keep work free of water.

3.3 PROOFROLLING

- A. Demolish and remove asphalt from the building site.
- B. After stripping and stockpiling of surficial organic soils per specifications, and prior to footing excavation, the newly exposed subgrade enclosed by a line drawn 5'-0" outside the building shall be proofrolled.

- C. Proofrolling shall consist of systematically trafficking the area, in perpendicular directions, utilizing a heavily loaded dump truck or similar equipment (20 tons minimum).

3.4 INSPECTION OF SUBGRADE

- A. Soft, loose, organic, old non-engineered fill, or unstable surface zones which are detected during proofrolling shall be scarified and compacted or be undercut to suitable material and backfilled. Request instructions from the Architect.
- B. Stockpile undercut materials by Fill Material classifications in on-site locations where it will not interfere with construction operations. Materials stockpiled shall be placed in a manner to afford drainage. Protect against erosion.
- C. Replace undercut material with Class I fill.

3.5 INSTALLATION OF CLASS I FILL

- A. Class I Fill shall be Earth Fill material except backfill immediately behind walls and under floor slabs, as indicated on drawings shall be Sand Fill or Pervious Stone.
- B. Compact within +/- 3% of optimum moisture in 8-inch loose lift layers (unless noted otherwise in the Geotechnical Report) to a density equivalent to 98% of the Standard Proctor Maximum (ASTM D698).

3.7 INSTALLATION OF BACKFILL

- A. Shore Foundation Walls which are to be tied into floor slabs prior to installation of backfill and until slabs have been in place sufficient time to achieve strength and provide structural stability against overturning.
- B. Where backfill is required on both sides of walls, it shall be brought up in even layers so as to provide an equal lateral load.
- C. Install backfill against foundation walls only when directed by the Architect and elsewhere as construction progress permits. Fill adjacent to walls shall be compacted using a hand-operated pneumatic or mechanical tamper. Restrict vehicular traffic within a distance from the wall equal to the wall height as a minimum.

3.8 EXCAVATION

- A. Excavate to elevations and dimensions, plus space to permit erection of forms and for waterproofing and installation of drains. All bottoms shall be clean cut, true, level, and sound. Any loosened soil exposed at the bottom of the excavations shall be removed or compacted to a density equivalent to 98% of the Standard Proctor Maximum (ASTM D698). Any water softened soils in foundation excavations shall be removed prior to steel and concrete placement. At no extra cost to the Owner, carry foundation concrete to the bottom of any excavation erroneously carried too deep, unless noted otherwise in the Geotechnical Report. If excavation is to be left

overnight during inclement weather, place a 2000 psi mud mat at the bottom of the excavation.

- B. For excavation of pipes or conduit under slab; install backfill in 8" to 12" loose lifts compacting each lift to 98% of the Standard Proctor Maximum (ASTM D698). Backfill shall be Earth Fill material.
- C. If suitable bearing for foundations is not encountered at the depth indicated on the drawings, the contractor shall notify Architect and Engineer and shall not proceed with any work until instructions are given and necessary measurements made to establish the additional volume of excavation, compacted fill and/or concrete.
- D. At excavations adjacent to existing foundations or footings the Contractor shall not remove lateral support from any existing footing or foundation without first underpinning or protecting the footing or foundation against settlement or lateral translation. The Contractor is solely responsible for determining if the removal of the existing soil may remove lateral support from the existing foundations. Method of underpinning or bracing of the existing foundation or footing is the responsibility of the Contractor. Excavation below existing foundations shall not occur without the approval of the Architect unless shown on the plans.

END OF SECTION