SECTION 02310

GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal and storage of topsoil.

B. Rough grading the site for site structures and building pads.

C. Topsoil and finish grading.

1.02 RELATED REQUIREMENTS

A. Section 02315 - Excavation.

B. Section 02316 - Fill and Backfill: Filling and compaction.

C. Section 02317 - Trenching for Site Utilities: Trenching and backfilling for utilities.

D. Appendix A - Geotechnical Investigation Report prepared by American Geotechnical, Inc.

1.03 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with County of Orange, Public Works Department standards.
   1. Maintain one copy on site.

PART 2 PRODUCTS

2.01 MATERIALS

A. Other Fill Materials: See Section 02316.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Protect identified structure/facility from damage above- and below-grade utilities to remain.

D. Notify utility companies as indicated on drawings.

3.03 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Remove subsoil from areas to be further excavated or re-graded.

C. See Section 02316 for filling procedures.

D. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

3.04 SOIL STOCKPILING

A. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.

3.05 FINISH GRADING

A. Before Finish Grading:
   1. Verify building and trench backfilling have been inspected.
   2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 4 inch in size. Remove soil contaminated with petroleum products.

C. Where topsoil is to be placed, scarify surface to depth of 12 inches.

D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 12 inches.

E. Place topsoil where required to level finish grade.

F. Place topsoil during dry weather.

G. Remove roots, weeds, rocks, and foreign material while spreading.

H. Near plants and buildings spread topsoil manually to prevent damage.

I. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

3.06 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

B. Top Surface of Finish Grade: Plus or minus 1/2 inch.

3.07 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

3.08 FIELD QUALITY CONTROL

A. See Section 02316 for compaction density testing.

3.09 CLEANING

A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.

B. Leave site clean and raked.

END OF SECTION

SECTION 02315

EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for building volume below grade, footings, paving, site structures, and utilities within the building.

B. Trenching for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Geotechnical report; bore hole locations and findings of subsurface materials.

B. Section 02310 - Grading: Soil removal from surface of site.

C. Section 02316 - Fill and Backfill: Fill materials, filling, and compacting.

D. Section 02317 - Trenching for Site Utilities: Excavating for utility trenches outside the building to utility main connections.

1.03 PROJECT CONDITIONS

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Protect bench marks, survey control paints, existing structures, fences, sidewalks, paving, and curb from excavation equipment and vehicle traffic.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

3.03 EXCAVATING

A. Underpin adjacent structures that could be damaged by excavating work.

B. Excavate to accommodate new structures, construction operations, and recommendations of soils investigation.

C. Notify Alexander + Hibbs AIA, Inc. of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

D. Cut utility trenches wide enough to allow inspection of installed utilities.

E. Hand trim excavations. Remove loose matter.

F. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 02316.

G. Grade top perimeter of excavation to prevent surface water from draining into excavation.

H. Remove excavated material that is unsuitable for re-use from site.

I. Stockpile excavated material to be re-used in area designated on site in accordance with Section 02310.

3.04 FIELD QUALITY CONTROL

A. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

3.05 PROTECTION

A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

END OF SECTION

SECTION 02316

FILL AND BACKFILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Filling, backfilling, and compacting for building volume below grade, footings, paving, site structures, and utilities within the building.

B. Backfilling and compacting for utilities outside the building to utility main connections.

C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 RELATED SECTIONS

A. Geotechnical report; bore hole locations and findings of subsurface materials.

B. Section 02310 - Grading: Removal and handling of soil to be re-used.

C. Section 02315 - Excavation: Removal and handling of soil to be re-used.

D. Section 02317 - Trenching for Site Utilities: Excavating for utility trenches outside the building to utility main connections.

E. Section 02783 - Concrete Pavers: Leveling bed placement under pavers.

F. Section 03300 - Cast-in-Place Concrete.

1.03 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

1.04 REFERENCE STANDARDS

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials.

B. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

C. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).

D. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

E. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)).

F. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

G. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

H. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

I. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

J. ASTM D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.05 SUBMITTALS

A. See Section 01350 - Submittals, for submittal procedures.

B. Samples: As requested by testing laboratory.

C. Materials Sources: Submit name of imported materials source.

D. Fill Composition Test Reports: Results of laboratory tests on actual materials used.

E. Compaction Density Test Reports.

1.06 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill: Conforming to County of Orange Public Works Department grading manual.

B. Structural Fill: Conforming to County of Orange Public Works Department grading manual.

C. Structural Fill:.
   1. Graded.
   2. Free of lumps larger than 4 inches, rocks larger than 4 inches, and debris.
   3. Conforming to ASTM D 2487.

D. Concrete for Fill: Lean concrete.

E. Concrete for Fill: As specified in Section 03300; compressive strength of 2500 psi.

F. Granular Fill: Coarse aggregate, conforming to County of Orange Public Works Department grading manual.

G. Topsoil: See Section 02310.

2.02 SOURCE QUALITY CONTROL

A. See Section 01410 - Testing and Inspection, for general requirements for testing and analysis of soil material.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the Work are as indicated.

B. Identify required lines, levels, contours, and datum locations.

C. See Section 02310 for additional requirements.

D. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

E. Verify structural ability of unsupported walls to support imposed loads by the fill.

3.02 PREPARATION

A. Scarify and proof roll subgrade surface to a depth of 6 inches to identify soft spots.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Fill up to finish grade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Reshape and re-compact fills subjected to vehicular traffic.

3.04 FILL AT SPECIFIC LOCATIONS

A. At Lawn Areas:
   1. Fill shall be topsoil as specified in Section 02810
   2. Fill up to 6 inches below finish grade elevations.
   3. Compact to 95 percent of maximum dry density.
   4. See Section 02810 for topsoil placement.

B. At Planting Areas Other Than Lawns:
   1. Fill shall be topsoil as specified in Section 02810.
   2. Fill up to 12 inches below finish grade elevations.
   3. Compact to 95 percent of maximum dry density.
   4. See Section 02810 for topsoil placement.

C. Under Pavers Set on Sand Leveling Bed:
   1. Fill up to bottom of sand leveling bed.
   2. Compact to 95 percent of maximum dry density.
   3. See unit pavers section for leveling bed placement.

3.05 CLEANING

A. Leave unused materials in a neat, compact stockpile.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION

SECTION 02317

TRENCHING FOR SITE UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Backfilling and compacting for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Geotechnical report; bore hole locations and findings of subsurface materials.

B. Section 02310 - Grading: Site grading.

C. Section 02315 - Excavation: Building and foundation excavating.

D. Section 02316 - Fill and Backfill: Backfilling at building and foundations.

1.03 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

1.04 REFERENCES

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials.

B. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

C. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).

D. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

E. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)).

F. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

G. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

H. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

I. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

J. ASTM D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.05 SUBMITTALS

A. See Section 01350 - Submittals, for submittal procedures.

B. Samples: As requested by testing laboratory.

C. Materials Sources: Submit name of imported materials source.

D. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

E. Compaction Density Test Reports.

1.06 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill: Conforming to County of Orange Public Works Department standard.

B. Concrete for Fill: Lean concrete.

C. Concrete for Fill: As specified in Section 03300; compressive strength of 2500 psi.

D. Granular Fill: Coarse aggregate, conforming to County of Orange Public Works Department grading manual.

E. Topsoil: Conforming to County of Orange Public Works Department.

2.02 SOURCE QUALITY CONTROL

A. See Section 01410 - Testing and Inspection, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 02310 for additional requirements.

C. Locate, identify, and protect utilities that remain and protect from damage.

D. Notify utility company to remove utilities.

E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

F. Protect plants, lawns, rock outcroppings, and other features to remain.

3.03 TRENCHING

A. Notify Alexander + Hibbs AIA, Inc. of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Cut trenches wide enough to allow inspection of installed utilities.

C. Hand trim excavations. Remove loose matter.

D. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

E. Remove excavated material that is unsuitable for re-use from site.

F. Stockpile excavated material to be re-used in area designated on site in accordance with Section 02310.

G. Remove excess excavated material from site.

3.04 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill per County of Orange standards and Soils Engineer.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.05 BACKFILLING

A. Backfill to contours and elevations indicated using unfrozen materials.

B. Fill up to finish grade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Reshape and re-compact fills subjected to vehicular traffic.

3.06 BEDDING AND FILL AT SPECIFIC LOCATIONS

A. Use general fill unless otherwise specified or indicated.

3.07 FIELD QUALITY CONTROL

A. See Section 01410 - Testing and Inspection, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, ASTM D2922, or ASTM D3017.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("standard Proctor"), ASTM D 1557 ("modified Proctor"), or AASHTO T 180.

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

3.08 CLEANING

A. Leave unused materials in a neat, compact stockpile.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION