

## SECTION 02200 - EARTHWORK

### PART 1 - GENERAL

#### RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### SUMMARY

This Section includes the following:

Providing 4" stone base under existing concrete slab areas that are being removed to provide subgrade access for new plumbing work to support new 4" concrete slab floors.

Excavating and backfilling of trenches within building lines for piping, foundations, footings, etc.

Excavating and Backfilling for Mechanical/Electrical Work: Refer to Divisions 15 and 16 sections for excavation and backfill required in conjunction with underground mechanical and electrical utilities and buried mechanical and electrical appurtenances.

**NOTE: ANY BAD SOILS (UNSUITABLE FOR REQUIRED COMPACTION) FOUND TWO FEET BELOW ORIGINAL GRADE AREA (AFTER STRIPPING THE TOP SOIL) REQUIRING REMOVAL WILL BE PAID FOR FROM BY UNIT PRICE AMOUNT. (ARCHITECT MUST BE NOTIFIED TO MEASURE QUANTITY PRIOR TO REMOVAL.)**

#### DEFINITIONS

Excavation consists of removal of material encountered to subgrade elevations indicated and subsequent disposal of materials removed.

**Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be at Contractor's expense.**

Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Architect.

In locations other than those above, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Architect.

Additional Excavation: When excavation has reached required subgrade elevations, notify Geotechnical Engineer, who will make an inspection of conditions. If Geotechnical Engineer determines that bearing materials at required subgrade elevations are unsuitable, **notify the architect immediately for instructions**, then continue excavation until suitable bearing materials are encountered and replace excavated material as directed by Geotechnical Engineer and approved by the Architect. The Contract Sum may be adjusted by an appropriate Contract Modification.

**PLEASE NOTE: Undercut and Fill Replacement Allowance: Architect's approval must be obtained prior to proceeding with undercut and fill work. Field measurements of undercut areas will be verified by the architect's representative. Payment from Undercut and Fill**

**Allowance will be based on the hole size after the removal of unsuitable soils. Truck Volume counts will not be an approved method for quantifying undercut and fill.**

Removal of unsuitable material and its replacement as directed will be paid on basis of Conditions of the Contract relative to changes in work.

Subgrade: The undisturbed earth or the compacted soil layer immediately below granular subbase and/or base, drainage fill, or topsoil materials.

Structure: Buildings, foundations, slabs, tanks, curbs, or other man-made stationary features occurring above or below ground surface.

## SUBMITTALS

Test Reports: Submit the following reports directly to Architect from the testing services, with copy to Contractor:

Compaction observation of the new concrete slab subgrade. **(Paid by Owner's Testing allowance)**

Verification of suitability of each footing subgrade material, in accordance with specified requirements **(Paid by Owner's Testing allowance)**.

Field reports of in-place soil density tests **(Paid by Owner's Testing Allowance)**.

Test reports required for the removal of unsuitable material and additional verification of subgrade material below intended excavation lines **(Paid by Owner's Testing Allowance)**.

## QUALITY ASSURANCE

Codes and Standards: Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.

Testing and Inspection Service: The **Owner** (thru the testing allowance within the contract) will employ and pay for a qualified independent geotechnical testing and inspection laboratory to perform soil testing and inspection service during earthwork operations. Contractor will coordinate scheduling and pay approved invoices. Should unsuitable soil be found at the footing or building pad excavation depth, additional Geotechnical testing will be paid on basis of General Conditions of the Contract relative to changes in work.

The General Contractor's superintendent will provide coordination of site visits with the testing agency's presence on the site as required by field conditions.

## PROJECT CONDITIONS

Site Information: Data in subsurface investigation reports was used for the basis of the design and are available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. The Owner will not be responsible for interpretations or conclusions drawn from this data by Contractor. Copies of this report are available for use in the Office of the Architect.

**No soil boring report is available for this property. Unsuitable soil found will be handled and compensated if discovered by using the testing allowance, Unit Prices and the Undercut and Fill Allowance.**

**Contractor may perform, at his option, additional test borings and other exploratory operations prior to bidding; however, no change in the Contract Sum will be authorized for such additional exploration.**

Existing Utilities: Locate existing underground utilities in areas of excavation work. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.

Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

**Use of Explosives: Do not bring explosives onto site or use in work.**

**Protection of Persons and Property:** Barricade open excavations occurring as part of this work and post with warning lights.

Operate warning lights as recommended by authorities having jurisdiction.

Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

**PART 2 - PRODUCTS**

**SOIL MATERIALS**

**General:** Provide borrow soil materials as required to raise elevation when sufficient satisfactory soil materials are not available from excavations.

**Satisfactory Soils:** ASTM D 2487 soil classification groups that are clean subsoil free from debris, waste, roots, topsoil, frozen material, vegetation or other deleterious matter and rock larger than 2" in any dimension that can be compacted to the density herein specified, under the conditions defined.

**Unsatisfactory Soils:** are defined as those complying with ASTM D2487ASTM soil classification groups that are not capable of being compacted to the densities required or rock material larger than 1/3 cu. ft. debris or consisting of organic material.

Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

**Base Material:** Naturally or artificially graded mixture of natural or crushed granite gravel, crushed granite stone, crushed granite slag, and natural or crushed sand.

**Drainage Fill:** Washed, evenly graded mixture of crushed stone, or crushed or uncrushed granite gravel, with 100 percent passing a 1-1/2 inch sieve and not more than 5 percent passing a No. 4 sieve.

Uses: Typical under floor slabs.

Typical around foundation drains.

**Backfill and Fill Materials:** Satisfactory soil materials free of clay, rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter. See drawing and subsurface investigation report for acceptable fill materials.

**PART 3 - EXECUTION**

**EXCAVATION**

**Excavation Classifications:** The following classifications of excavation will be made when rock is encountered:

**Earth Excavation** includes excavation of pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as rock or unauthorized excavation.

Additional Excavation: When excavation has reached required subgrade elevations, notify Architect/Engineer who will make an inspection of conditions.

If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by Architect/Engineer.

Removal of unsuitable material and its replacement as directed will be paid on basis of contract conditions relative to changes in work.

Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

Dispose of excess soil material and waste materials legally off site.

Excavation for Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room.

Except as otherwise indicated, excavate for exterior water bearing piping (water, steam, condensate, drainage) so top of piping is not less than 2'-6" below finished grade.

Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

## STABILITY OF EXCAVATIONS

General: Comply with local codes, ordinances, and requirements of agencies having jurisdiction.

Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.

## DEWATERING

Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

## STORAGE OF EXCAVATED MATERIALS

Stockpile excavated materials acceptable for backfill and fill where directed. Place, grade, and shape stockpiles for proper drainage.

Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.

**Dispose of excess excavated soil material and materials not acceptable for use as backfill or fill.**

## EXCAVATION FOR STRUCTURES

Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot.

Excavations for footings and foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

## TRENCH EXCAVATION FOR PIPES AND CONDUIT

Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches of clearance on both sides of pipe or conduit.

Excavate trenches and conduit to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil.

## COLD WEATHER PROTECTION

Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

## BACKFILL AND FILL

General: Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in Part 2 of this Section.

Under building slabs, use drainage fill material.

Under piping and conduit and equipment, use base materials where required over rock bearing surface and for correction of unauthorized excavation. Shape excavation bottom to fit bottom 90 degrees of cylinder.

Do not backfill trenches until tests and inspections have been made and Architect authorizes backfilling. Use care in backfilling to avoid damage or displacement of pipe systems.

Backfill excavations as promptly as work permits, but not until completion of the following:

Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.

Removal of concrete formwork.

Removal of trash and debris from excavation.

Removal of permanent or temporary horizontal bracing in place on horizontally supported walls.

## PLACEMENT AND COMPACTION

Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas or lifts as directed by Architect if soil density tests indicate inadequate compaction.

Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of standard proctor maximum dry density, in accordance with ASTM D 698:

Under structures, building slabs and steps, and pavements, compact subgrade and each layer of backfill or fill material at 98 percent maximum density. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.

Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

## GRADING

Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2 inch when tested with a 10-foot straightedge.

Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

## FIELD QUALITY CONTROL

Quality Control Testing During Construction: **The Owner** shall provide all soil testing necessary to insure that compacted soils and subgrades meet specified standards and in no case shall these tests be less than the following schedule. Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.

Paved Areas and Building Slab: Perform at least one field density test of subgrade for every 500 sq. ft. of building slab, but in no case fewer than three tests. In each compacted fill layer, perform one field density test for every 1,000 sq. ft. of overlaying building slab or paved area, but in no case fewer than three tests.

If in opinion of Architect, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, perform additional compaction and testing until specified density is obtained, the cost of this retesting shall be paid as part of the contractor's project costs.

## EROSION CONTROL

Provide erosion control methods in accordance with requirements of authorities having jurisdiction and requirements indicated in the drawings.

## MAINTENANCE

Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather scarify surface, reshape, and compact to required density prior to further construction.

Settling: 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. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

## DISPOSAL OF EXCESS AND WASTE MATERIALS

Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash, and debris, and dispose of it off Owner's property.

End of SECTION 02200

## SECTION 02361 - TERMITE CONTROL

### PART 1 - GENERAL

#### RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### SUMMARY

This Section includes the following for termite control:

Soil treatment.

#### DEFINITIONS

EPA: Environmental Protection Agency.

PCO: Pest control operator.

#### SUBMITTALS

Product Data: Treatments and application instructions, including EPA-Registered Label.

Product Certificates: Signed by manufacturers of termite control products certifying that treatments furnished comply with requirements.

Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

Warranties: Special warranties specified in this Section.

#### QUALITY ASSURANCE

Applicator Qualifications: A PCO who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment in jurisdiction where Project is located and who is experienced and has completed termite control treatment similar to that indicated for this Project and whose work has a record of successful in-service performance.

Regulatory Requirements: Formulate and apply termiticides, and label with a Federal registration number, to comply with EPA regulations and authorities having jurisdiction.

#### PROJECT CONDITIONS

For maximum distribution of soil treatment pesticide, soil should not be either excessively wet or frozen.



Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with EPA-Registered Label requirements and requirements of authorities having jurisdiction.

### COORDINATION

Coordinate soil treatment application with excavating, filling, and grading and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs, before construction.

### WARRANTY

General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### SOIL TREATMENT

Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in a soluble or emulsible, concentrated formulation that dilutes with water or foaming agent, and formulated to prevent termite infestation. Use only soil treatment solutions that are not harmful to plants. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to the product's EPA-Registered Label.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

AgrEvo Environmental Health, Inc.; a Company of Hoechst and Schering, Berlin.  
Bayer Corp.; Garden & Professional Care.  
DowElanco.  
FMC Corp.; Pest Control Specialties.  
Termidor (Fipronyl)  
Zeneca Professional Products.

## PART 3 - EXECUTION

### EXAMINATION

Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of the soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control. Proceed with application only after unsatisfactory conditions have been corrected.

### PREPARATION

General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparing substrate. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil and around foundations.

Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended by termiticide manufacturer.

Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

### APPLICATION, GENERAL

General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

### APPLYING SOIL TREATMENT

Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute the treatment evenly.

Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.

Masonry: Treat voids.

Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

Post warning signs in areas of application.

Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

End of SECTION 02361