PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
A. This Section pertains to an area bounded by 5 feet minimum outside of and parallel to the exterior walls of the building, including canopies, and other structures attached to building.
B. The work includes the following:
   1. Removal of the existing basement, ground floor slabs, foundation walls, and footings of the existing buildings and their backfill with well compacted Structural Fill.
   2. Removal of portions of the existing sanitary sewer line that crosses the site and its backfill with well compacted Structural Fill.
   3. Preparing subgrade for building slabs, walks, and pavements.
   4. Preparing subbase for support of building slabs.
   5. Excavating and backfilling for building structure.
   6. Excavating and backfilling of trenches within building lines.
   7. Excavating and backfilling for underground mechanical and electrical utilities and buried mechanical and electrical appurtenances.
C. Related Sections: The following sections contain requirements that relate to this section:
   1. Section 310000 – Earthwork (Broadscope).
   2. Section 311000 – Site Clearing.
   3. Section 312333 – Trenching and Backfilling.
   4. Section 312501 – Environmental Protection and Erosion and Sediment Control.

1.3 QUALITY ASSURANCE
B. Routine testing of existing soils and compacted material for compliance with these Specifications shall be performed by a testing agency acceptable to Architect/Engineer.
   1. Compacted material which does not meet density requirements shall be removed and/or recompacted, and retested.

1.4 DEFINITIONS
A. Excavation consists of removal of material encountered to subgrade elevations indicated and subsequent disposal of materials removed.
B. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect/Engineer. Unauthorized excavation, as well as remedial work directed by Architect/Engineer, shall be at Contractor's expense.
1. 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/Engineer.

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

C. Additional Excavation: When excavation has reached required subgrade elevations, notify Architect/Engineer and Geotechnical Engineer, who will make an inspection of conditions. If Geotechnical Engineer determines that bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered, and replace excavated material as directed by Geotechnical Engineer. The Contract Sum may be adjusted by an appropriate contract modification.

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

D. Subgrade: The undisturbed earth or the compacted soil layer immediately below granular subbase, base of structure, or topsoil materials.

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

1.5 SUBMITTALS

A. Submit mix design proposed for flowable fill at least 15 days before start of backfilling.

1.6 TESTING SERVICES

A. The Owner will employ a testing laboratory to perform the following services:

1. Test materials proposed for use by Contractor to verify specified requirements and determine optimum moisture at which maximum density can be obtained in accordance with ASTM D 1557, Modified Proctor.

2. Perform field density tests for all fill material within building area.

3. Testing agency shall inspect and approve each subgrade and fill layer before further backfill or construction work is performed. Approval shall be based on satisfactory achievement of compaction criteria.

4. Testing agency shall submit copies of reports within 7 days of test to Architect/Engineer, Owner, Contractor, and Geotechnical Engineer. Include date of testing, location, elevation, and readings of all density tests.

1.7 GEOTECHNICAL EVALUATION (SOILS REPORT)

A. The Owner employed C.T. Male Associates, P.C. (Geotechnical Engineer) to investigate sub-surface soil conditions and make recommendations regarding sitework construction procedures.

1. Perform all work in accordance with the recommendations and requirements therein.

2. If conflicts exist between the Geotechnical Evaluation and the Contract Drawings and Specifications, the more stringent requirements shall apply.

1.8 QUALITY CONTROL

A. The Special Inspector, selected and paid by the Owner, shall be retained for quality control and to review test data provided by testing agency in accordance with the Statement of Special Inspections.
1. The Special Inspector shall review and approve all materials proposed by Contractor for use as compacted fill based on test data and information submitted by testing agency.

2. The Special Inspector shall evaluate the condition of the bottom of excavation, verify footing bearing strata, review and approve filling and compaction procedures, and be present to review and approve preparation of slab-on-grade subgrade and subbase.
   a. Any discrepancies from the Contract Documents found during a Special Inspection shall be immediately reported to the Contractor. If the discrepancies are not corrected, the Special Inspector shall notify the Architect/Engineer, Geotechnical Engineer and Building Official.
   b. Reports shall document all discrepancies identified and the corrective action taken.

B. The Special Inspector shall submit copies of reports to Architect/Engineer, Geotechnical Engineer, Contractor, and Owner. Include date of site visit, description of work observed, and summary of observations and recommendations.

1.9 RESPONSIBILITIES OF CONTRACTOR

A. Advise testing agency sufficiently in advance of operation to allow assignment of personnel. Coordinate daily testing requirements with testing service.

B. Advise Special Inspector/Geotechnical Engineer sufficiently in advance of operation to schedule inspections and review of work specified.

C. Use of testing services and review by Special Inspector/Geotechnical Engineer shall in no way relieve Contractor of his responsibility to furnish materials and construction as specified

1.10 PROJECT CONDITIONS

A. Site Information: Subsurface investigation reports were 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.
   1. Additional test borings and other exploratory operations may be performed by Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.

B. Existing Utilities: Locate existing underground utilities in area of Work before starting earthwork operations. Where utilities are to remain in place, provide adequate means of protection during earthwork operations.
   1. If uncharted or incorrectly charted piping or other utilities are encountered during excavation, consult utility owner and Architect/Engineer immediately for directions. Cooperate with Owner and public and private utility companies to keep their respective services and facilities in operation. Repair damaged utilities as required by utility owner.
   2. Do not interrupt existing utilities serving facilities occupied by Owner or others during occupied hours, except when permitted in writing by Architect/Engineer and then only after acceptable temporary utility services have been provided.
      a. Provide minimum of 48-hour notice to Architect/Engineer, and receive written notice to proceed before interrupting any utility.
   3. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff of services if lines are active.

C. Use of Explosives: Do not bring explosives onto site nor use in Work.
D. Protection of Property: Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
   1. Perform excavation by hand within drip line of large trees to remain. Protect root systems from damage or dry out to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with moistened burlap.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General Fill Material: Soil materials free of clay, rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

B. Flowable Fill Material: Cementitious, flowable, excavatable, backfill material having a compressive strength of 50 to 100 pounds per square inch (psi) at 28 days. Provide a mix which minimizes shrinkage.

C. Structural Fill: Sand and gravel which are sound, durable, and free of organic and other deleterious materials conforming to the following limits of gradation:

<table>
<thead>
<tr>
<th>Percent Passing by Weight</th>
<th>Sieve Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>4&quot;</td>
</tr>
<tr>
<td>75 to 100</td>
<td>1/4&quot;</td>
</tr>
<tr>
<td>50 to 95</td>
<td>No. 40</td>
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<tr>
<td>0 to 10</td>
<td>No. 200</td>
</tr>
</tbody>
</table>

D. Subbase Material: Sand and gravel which are sound, durable, and free of organic and other deleterious materials conforming to New York State Department of Transportation, Paragraph 304-2.02, Type 2, conforming to the following limits of gradation:

<table>
<thead>
<tr>
<th>Percent Passing by Weight</th>
<th>Sieve Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>2&quot;</td>
</tr>
<tr>
<td>25 to 60</td>
<td>1/4&quot;</td>
</tr>
<tr>
<td>5 to 40</td>
<td>No. 40</td>
</tr>
<tr>
<td>0 to 10</td>
<td>No. 200</td>
</tr>
</tbody>
</table>

E. Crushed Stone: Sound, durable and free of organic and other deleterious material. Crushed stone shall be an equal blend of No. 1 and No. 2 size stone, conforming to NYSDOT standard specification, Section 703-02.

F. Bedding: Comply with the requirements of Specification Section 312333 - Trenching and Backfilling.

G. Vapor Retarder: Provide vapor retarder cover over prepared subbase material where indicated below slabs on grade. Use only materials that are resistant to deterioration when tested in accordance with ASTM E 154.
PART 3 - EXECUTION

3.1 JOB CONDITIONS
   A. Examine all substrates and conditions under which Work shall be performed. Do not proceed with Work until all unsatisfactory conditions are corrected.
   B. Drainage shall be maintained and traffic within building area shall be restricted during construction to maintain integrity of subgrade. Failure to observe these precautions will require Contractor, at his own expense, to remove disturbed areas and correct.

3.2 COLD WEATHER PROTECTION
   A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.3 REMOVALS
   A. Clear, grub, and strip site of vegetation, topsoil, and other organic materials.
   B. Remove all brick fragments and other construction debris. Plow-strip or breakup sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
      1. When existing ground surface has a density less than that specified 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.
   C. Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash, and debris, and legally dispose of it off Owner's property.

3.4 EXCAVATION
   A. Excavation shall be considered unclassified, and understood to mean any and all materials encountered during excavation.
   B. Excavations shall be laid back or sheeted and braced to prevent sloughing in of sides. Maintain sides and slopes of excavations in stable condition until completion of backfill; however, cut slopes shall be inclined no steeper than 1 vertical to 1.5 horizontal.
   C. Loose material and debris shall be kept out of excavations.

3.5 DEWATERING
   A. Perform excavation and filling in a manner and sequence that shall provide proper drainage at all times.
   B. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.
      1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting of footings, and soil changes detrimental to stability of subgrades and foundations.
      2. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
3. Temporary drainage of the crushed stone course can be promoted through crowning of the subgrade and pumping as needed along the edge of the basement excavation.

4. 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.

3.6 STORAGE OF EXCAVATED MATERIALS

A. Stockpile excavated materials acceptable for general fill. Place, grade, and shape stockpiles for proper drainage.
   1. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.
   2. Dispose of excess excavated soil material and materials not acceptable for use as general fill.

3.7 TRENCH EXCAVATION FOR PIPES AND CONDUIT

A. 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.

B. Do not locate trenches which are deeper than adjacent footings closer horizontally to the footing than the vertical distance separating the bottom of trench and bottom of footing.

C. 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. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
   1. Where rock is encountered, carry excavation 6 inches below required elevation and backfill with a 6-inch layer of bedding prior to installation of pipe.
   2. For pipes or conduit less than 6 inches in nominal size, and for flat-bottomed, multiple-duct conduit units, do not excavate beyond indicated depths. Hand-excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.
   3. For pipes and equipment 6 inches or larger in nominal size, shape bottom of trench to fit bottom of pipe for 90 degrees (bottom 1/4 of the circumference). Fill depressions with bedding or tamped sand backfill. At each pipe joint, dig bell holes to relieve pipe bell of loads to ensure continuous bearing of pipe barrel on bearing surface.

3.8 FILLING, BACKFILLING, AND COMPACTION

A. Do not place fill material on surfaces that are muddy, frozen, or contain frost or ice.

B. Use excavated on-site soils or structural fill to increase grades within building areas, and as backfill against foundations and in trenches.

C. Use subbase material directly below slabs and pavements as shown on Drawings.

D. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings, and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing.

E. Backfill foundation excavations as soon as possible following construction of foundations and foundation walls.
F. Backfill and fill against foundation walls evenly on both sides to prevent any displacement of construction.

G. All walls that are to be backfilled on one side only maybe backfilled up to 3 feet above the top of footing after walls attain minimum strength of 70% specified 28-day compressive strength (f'c). Remaining backfill may not be placed until top slab is in place, slab attains minimum strength of 70% f'c, and walls attain minimum strength of 100% f'c.

H. Begin filling in the lowest section of the area.

I. Place fill material (except crushed stone) in layers not more than 12 inches in loose depth, for material compacted by heavy compaction equipment, and not more than 8 inches in loose depth for material compacted by hand-operated tampers.

J. Any lift or portion thereof which is not compacted in accordance with Specifications shall be recompacted or removed and replaced to meet compaction requirements.

K. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density, in accordance with ASTM D 1557:
   1. Under structures, building slabs and steps, walkways, and pavements, compact each layer of fill material to 95 percent of the materials maximum dry density.
   2. Under lawn or unpaved areas, compact top 6 inches of subgrade and each layer of fill material to 90 percent of the materials maximum dry density.

L. Where a power roller is used for compaction, do not approach nearer than 10 feet from the walls of new or existing construction.

M. 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.
   1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
   2. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by disking, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

3.9 TOLERANCES

A. Excavation for structures shall conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot, except to facilitate drainage during construction stage.

B. Surface of subbase under building slabs shall be graded smooth and even, free of voids, and rolled to required elevation. Provide final grades within a tolerance of 1/2 inch when tested with a 10-foot straightedge.