

Exhibit B8 Preliminary Earthwork Inspection Requirements

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

SECTION 310000

EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section shall include, but not be limited to, the following:

1. Removal of existing pavements, curbs, sidewalks, tanks, abandoned pipes, utilities, foundations, and other structures encountered which require removal for successful completion of the Work.
2. General excavation to levels established within the Contract Drawings and as described herein.
3. Local excavation for the pile caps, slabs, walls, and other foundation elements on the Contract Drawings.
4. Excavation, fill placement, grading and compaction to required elevations for appurtenances and general site work as shown on the Contract Drawings and as directed herein.
5. Excavation and trenching for mechanical trades, including but not limited to plumbing, heating, water, steam, gas, and electric within and outside the site as shown on the Contract Drawings or as required to make the Work complete; backfilling same with suitable fill as described herein; and thoroughly compacting said materials to "Rough Grading" elevations.
6. Excavation and trenching for temporary works as shown or as required; backfilling same with approved fill; compaction and rough grading.
7. Removal of unsuitable soils, replacement with approved fills, and compaction as dictated by site conditions or as directed by the Special Inspector(s).
8. Improvement of subgrade conditions via compaction, installation of geotextiles, and/or placement of approved fill as directed by the Geotechnical Engineer engaged by the Owner (Owner's Engineer / Owner's Geotechnical Engineer).
9. Processing of on-site materials for reuse.
10. Furnishing approved material for filling and rough grading, as required.
11. Scarifying and moisture control of material, as needed.
12. Removal and legal disposal of surplus excavated materials that is unsuitable for use as fill or backfill.
13. Subgrade preparation for pile caps, slabs, sidewalks and other structural elements.
14. All temporary excavation support as required to achieve the Work of this Section.
15. Protection of adjacent structures, utilities, and pavements.
16. Placement and compaction of fill, structural fill, bedding layer, drainage fill, and crushed stone.
17. Temporary groundwater control, as required, for execution of the Work of this Section and for all other related foundation Work.
18. All other labor, equipment, and materials as may be reasonably inferred to be required to make the Work under this Section complete.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

1.2 RELATED SECTIONS AND DOCUMENTS

The general provisions of the Contract, including without limitation all terms and conditions of the Contract, all Drawings, all Specifications, are incorporated into this Section and are part of this Section.

STANDARDS, REFERENCES, AND REGULATORY REQUIREMENTS

- A. General: Except as modified or voided by requirements specified herein or by details or notes included in the Contract Drawings, the Work specified under this Section shall conform to all applicable provisions of the codes, specifications, standards and other reference documents cited in this Specification and/or noted in the Contract Drawings.
- B. Codes: All Work under this Section shall conform to the most restrictive requirements of the New Jersey edition of the International Building Code, and to the regulations of all governmental authorities having jurisdiction.
- C. Where more stringent, the following codes, standards and specifications (latest edition), shall apply to the Work of this Section, all as modified herein or by the Building Code:
1. Building Code Requirements for Structural Concrete, ACI 318.
 2. Specification for Structural Steel Buildings, ANSI/AISC 360.
 3. Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7
 4. Design Load on Structures During Construction, ASCE 37
 5. Structural Welding Code – Steel, ANSI/AWS D1.1.
 6. Structural Welding Code – Reinforcing Steel, ANSI/AWS D1.4.
- D. American Society for Testing and Materials (ASTM) Standards cited in the reference standards, codes, Building Code, this specification or in cited reference documents shall be the year of adoption or tentative adoption and revision listed in the latest edition of the Annual book of ASTM Standards, "Index:", except that, should a specific year of adoption or revision be cited by the Contract Documents, by the Building Code, or be proposed by the Contractor and accepted by the Owner's Engineers, that edition shall apply to and control the work.
1. ASTM C33 Standard Specifications for Concrete Aggregates.
 2. ASTM D1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
 3. ASTM D2216 Test Method for Laboratory Determination of Water (Moisture) Content of Rock and Soil.
 4. ASTM D2487 Test Method for Classification of Soils for Engineering Purposes.
 5. ASTM D4318 Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 6. ASTM D6913 Standard Test Method for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.
 7. ASTM D6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- E. Geotechnical Report: The Owner's Geotechnical Engineer has prepared a report entitled *Geotechnical Engineering Report for Cooper University Health Care – Master Campus Plan*, prepared by Langan Engineering and Environmental Services, LLC (9 July 2024). Copies of the report are available to the Contractor for reference. Boring and other in situ test logs are made available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between borings. The Owner will not be responsible for interpretation conclusions drawn from this data by the Contractor.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- F. Any transporter of contaminated/hazardous materials shall be licensed in the state in which handling and transportation shall take place in accordance with all applicable regulations. Refer to Specifications 31 10 01 Material Management and Waste Disposal and 01 35 44 Unforeseen Environmental Conditions for additional details and specifications regarding handling, transportation, and disposal of contaminated/hazardous materials at the site.
- G. Comply with OSHA (Occupational Safety and Health Administration) Standards and Regulations contained in Title 29 CFR Part 1910.120 "Hazardous Waste Operations and Emergency Response."
- H. Where reference is made to one of the above standards, the revision in effect at the time of the bid opening shall apply.
- I. In case of conflict between regulations and specifications, the Contractor shall comply with the most stringent requirements outlined in the applicable codes, regulations, and specifications.
- J. Nothing in clause 1.3 shall relieve Contractor or Subcontractor of their responsibility of providing a higher standard than the relevant Code or Standard, to comply with this Specification.

1.3 DEFINITIONS

- A. Site: the area defined on the Contract Drawings.
- B. Wherever the word "excavating", "excavate", "excavation", "carried down", "remove", etc., are used, they shall be taken to include the removal of all existing materials, including but not limited to rubble, former foundation remnants, rubbish, earth, boulders, concrete and all other materials and obstructions encountered; they shall also be taken to include all temporary excavation support, bracing, groundwater control, and all other operations and items needed for the proper execution of the Work.
- C. Unauthorized Excavations: Excavations below subgrade elevations or beyond indicated lines and dimensions without direction by the Owner or Owner's Engineers. Unauthorized excavations shall be without additional compensation.
- D. Backfill/Fill: soil materials used to fill an excavation.
- E. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill layer (not part of pavement construction or structure layers).
- F. Satisfactory soils: any suitable material which is acceptable and has the necessary properties to fulfill the Specification requirements.
- G. Unsatisfactory soils: any material which does not have the necessary properties to fulfill the Specification requirements.
- H. Where the words "finished grades", "finished grade lines", or "future finished grades", appear in these specifications, they shall be taken to mean the finished elevations as indicated on the Contract Drawings.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- I. Rough grading consists of cutting or filling to the elevation herein established with a permissible tolerance of plus or minus 1 inch. This tolerance shall be used within any area of 100 square feet so that removing excess or placing additional fill will not be required to meet the required elevations.
 - J. Pre-excavation consists of excavation necessary to remove obstructions prior to installation of excavation support. Pre-excavation shall include all necessary backfilling and compaction to provide a suitable working surface for support of excavation wall construction.
 - K. General fill: fill material used to raise the general site levels to finished level of the bulk earthworks shown on the drawings.
 - L. Structural fill: fill within areas to make up levels beneath the footprint of all structures and backfill to retaining walls.
 - M. Imported materials: satisfactory material obtained from outside of the site, and in accordance with requirements under this Specification.
 - N. Maximum dry density: the dry density of the soil obtained using a specified amount of compaction at the optimum moisture content when determined in accordance with ASTM D1557.
 - O. Optimum moisture content: The moisture content of soil at which a specified amount of compaction will produce the maximum dry density when determined in accordance with ASTM D1557.
 - P. Topsoil: natural or cultivated surface-soil layer containing organic matter or other deleterious materials, including roots, sand, silt, gravel, and clay. Topsoil is generally friable and pervious and extends to the depths shown on the Contract Drawings. Topsoil must meet the most stringent New Jersey Department of Environmental Protection (NJDEP) standards.
 - Q. Settlement: the amount of vertical movement of a surface due to the application of a load to the surface.
 - R. Residual Settlement: the difference between original and final elevations of a surface resulting from the application and removal of one or more loads to and from the surface.
 - S. Rebound Settlement: The amount of vertical rebound of a surface that occurs when the load is removed from the surface.
- 1.4 SUBMITTALS
- A. Unless otherwise indicated, transmit all submittals to the Construction Manager for review. Review of submittals by the Construction Manager, Owner's Architect, and Owner's Engineers is required before proceeding with ordering, fabricating, or any work of this Section. Submittal review will be of concept only and shall not in any way diminish or limit Contractor's responsibility for the quality and performance of their work. All material orders are the sole responsibility of the Contractor.
 - B. The Contractor must submit the following information for each source and type of fill material proposed for use (including borrow sources and on-site sources) for review and approval by the Owner's Engineer:

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

1. Geotechnical test reports as follows:
 - a. Particle size analysis in accordance with ASTM D6913
 - b. Soil classification in accordance with ASTM D2487
 - c. Atterberg Limits in accordance with ASTM D4318
 - d. Moisture content in accordance with ASTM D2216
 - e. Modified Compaction Curve in accordance with ASTM D1557
 2. Include data for all samples indicating the exact location and methods of transportation and placement of all materials.
 3. For virgin quarry sources, identify source and provide mine certification and clean fill certification letter from quarry. For all other sources, identify source and provide analytical data and all available documentation regarding the source of the material. Analytical must meet the NJDEP "Fill Material Guidance" sampling requirements and all results must be below the most stringent NJDEP Soil Remediation Standards (SRS).
- C. Contractor shall submit all fill import tickets to the Owner's Engineer on a monthly basis or more frequently.
- D. Samples:
1. When requested, the Contractor shall submit samples of materials proposed for use as fill, including, but not limited to general fill, drainage fill, structural fill, pavement subbase, etc. Samples shall be submitted at least 1 week before proposed use on site. Test reports as required under Section 1.5.B shall accompany each sample.
 2. When requested, submit a 12-inch by 12-inch sample of each geotextile filter fabric, geogrid, and drainage panel proposed for use.
 3. When requested, submit a 12-inch-long sample of the proposed drainage pipe.
- E. Submit mix designs, vendor information, materials test data and reports and any other pertinent product data for all proposed concrete fill including but not limited to: structural concrete, lean concrete, and controlled low strength materials (CLSM). All concrete fill mix designs shall be prepared by a Professional Engineer, licensed in New Jersey.
- F. Shop Drawings: Submit detailed shop drawings and calculations to be reviewed by the Owner's Engineer. The drawings and calculations shall be prepared by a Professional Engineer licensed in New Jersey. The submittals shall include but are not limited to following:
1. Earth excavation procedures.
 2. Temporary excavation support where required by field conditions. Submit shop drawings, manufacturer's literature, and engineering calculations, and show and describe proposed excavation support system, general arrangement and sequencing procedures to be used, method of installation, materials, equipment, and emergency action plans.
 3. Temporary dewatering procedures where required by field conditions. Submit shop drawings, manufacturer's literature, and engineering calculations, and show and describe proposed groundwater control system, general arrangement procedures to be used, method of installation, materials, equipment, methods of treatment and disposal of pumped water, emergency action plans, and procedures for deactivating the system. Refer to Specifications 31 10 01 Material Management and Waste Disposal and 01 35 44 Unforeseen Environmental Conditions for additional details and specifications regarding handling, transportation and disposal of contaminated/hazardous materials at the site.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

4. Fill materials, equipment, and procedures for placement and methods of compaction, where required.
 - G. Catalog Cuts: Submit catalog cuts and manufacturer's literature for all compaction equipment, vapor barriers, geosynthetics, and drainage materials including composite sheets and piping.
 - H. All required certifications and permits pertaining to the work of this Section.
 - I. Certification for Examination of Site and Records: Before proceeding with the Work of this section, submit certification in an acceptable form, signed by the Contractor, stating that careful examination has been made of the site, existing structures, existing adjacent structures, records of utility lines, test boring records, soil samples, subsurface exploration reports, the Contract Drawings, and all other Contract Documents.
 - J. Substitutions: Should the Contractor desire a substitution from the Contract Drawings or specifications, or both, Contractor shall submit the specific substitution in writing prior to submittal of Shop Drawings. Requests for substitutions shall be submitted on the Contractor's letterhead. Approval of the Contractor's request for substitutions shall be at the discretion of the Owner and Owner's Engineers. Rejection of substitutions shall not be grounds for an adjustment to the Contract price.
- 1.5 PROJECT CONDITIONS
- A. Subsurface Conditions: The subsurface conditions at the site are generally characterized by a layer of uncontrolled fill containing demolition debris over an upper sand and silty sand, clay and silt with organics, and finally a dense sand. Groundwater is estimated to be about elevation 3 to 3.6 feet (NAVD88). Additional details pertaining to the subsurface conditions are presented in the Geotechnical Engineering Report, prepared by Langan Engineering and Environmental Services, dated 7 September 2023 and updated 9 July 2024. This information is provided for the Contractor's information only.
 - B. Boring logs are available for the Contractor's review. The Owner makes no predictions or representations regarding the character or extent of soil, groundwater, or other subsurface conditions to be encountered during the work. The Contractor shall make their own deductions of the subsurface conditions which may affect the methods or cost of construction of the work hereunder, and agrees that he will make no claims for damages or compensations, except as are provided under the agreement, should he find conditions during the progress of the work different from those as calculated or anticipated by him.
 - C. The Contractor, by careful examination, shall inform himself as to the nature and location of the work; the conformation of the ground and the nature of the subsurface conditions; the locations of the groundwater table; the character, quality and quantity of the materials to be encountered; the character of the equipment and facilities needed prior to and during the execution of the work; and all other matters which can be in any way effect the work.
 - D. The Contractor shall be held to have visited the site and to have familiarized himself with the existing conditions of adjoining properties, utilities, and buildings.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- E. The Contractor shall investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to, ingress and egress of the site of the work. The Contractor shall conform to all Camden, State, and Federal regulations in regard to the transportation of materials to and from and at the job site and shall secure in advance such permits as may be required.
- F. Examine drawings to determine sequence of operations, and relation to work of other trades. Start of work will signify acceptance of field conditions and will acknowledge coordination with other trades.

1.6 EXISTING UTILITIES

- A. Locate existing underground utilities in and beyond the areas of work. If utilities are indicated to remain in place, provide adequate means of support and protection during the work. Utilities scheduled for relocation are identified in the Contract Documents. Procedures for utility clearance are included in the Contract Documents.
 - 1. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult utility owner immediately for direction. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 - 2. Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by the Construction Manager and then only after acceptable temporary utility services have been provided. Provide minimum of 48-hour notice to the Construction Manager, 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.

1.7 PROTECTION

- A. The work shall be executed so that no damage or injury will occur to the existing public and adjoining or adjacent structures, streets, paving, sewers, gas, water, electric or any other utilities. Should any damage or injury caused by the Contractor, or anyone in Contractor's employ, or by the work under this Contract occur, the Contractor shall, at their own expense, repair such damage and shall assume all responsibility for such injury.
- B. The above shall also include the protection of all existing utilities (including sewers, water lines, electrical lines, telecommunication lines, etc.) to remain in use within and adjacent to the area affected by the work of this project.
- C. Monuments, benchmarks, monitoring points, and other reference features on streets and structures in the work area shall be protected. Should these be disturbed in any manner, they shall be reset by a Professional Land Surveyor, at the Contractor's expense.
- D. While performing work of this Section, or any other related Section, the Contractor shall take care that their operations do not adversely affect the stability and integrity of existing buildings and structures in the vicinity, or induce settlement in them.
- E. Provide barricades, warning lights, barriers, etc., to prevent accidents, avoid all necessary hazards and protect the public, the work and property at all times, including Saturdays, Sundays and Holidays.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- F. Provide protection to sidewalks and pedestrians as required.
- G. Erosion and sediment control and dust control shall be in accordance with the Contractor's Site Management Plan.

1.8 ERRORS IN DEPTH

- A. In the event that any part of the excavation be carried, through error, beyond the depth and the dimensions indicated on the drawings, called for in the specifications, or directed by the Owner's Engineer, then the Contractor, at their own expense, shall furnish and install approved backfill materials with which to fill to the required level without additional cost to the Owner.

1.9 QUALITY ASSURANCE

- A. Materials and work shall conform to the latest edition of reference standards specified herein and to applicable codes and requirements of local authorities having jurisdiction.
- B. The Contractor shall be responsible for the site preparation, and maintenance of the excavation and backfill to ensure its stability to meet the criteria specified herein. The Contractor shall make their own assessment of existing site conditions taking account of any ground exploration and other relevant data available and which shall influence the chosen methods and sequence of construction including choice of equipment.
- C. The Contractor shall maintain the earthwork in a manner which does not compromise the work or stability. The work shall be coordinated so that the construction process is optimized.
- D. The Contractor shall be responsible for the quality of all material to be used in the work and shall regularly inspect the work each day to ensure that adverse deformation of the ground is not occurring.
- E. The Contractor shall be responsible to assess at the start of work the quantity of Satisfactory Material available from the excavation for use as fill material and the requirement for imported fill material. The Contractor shall plan earthwork operations to minimize the double handling of fill material and disruption due to dust and noise from transportation operations.
- F. Contractor Qualifications.
 - 1. The Contractor performing the work of this Section shall be a qualified excavation contractor with at least 5 years of relevant field experience on projects of similar size, scope, and complexity.
- G. Codes and Permits:
 - 1. Comply with the New Jersey edition of the International Building Code, and any other Federal, State, or Local codes and ordinances having jurisdiction.
 - 2. All labor, materials, equipment and services necessary to make the work comply with such requirements shall be provided without additional cost to the Owner.
 - 3. The Contractor shall procure and pay for all permits and licenses required to complete the work of this Section.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

1.10 QUALITY CONTROL – INSPECTION AND TESTING

- A. Special Inspection: The Owner shall engage, under the requirements of Section 1704 and 1705 of the New Jersey edition of the International Building Code, one or more Special Inspection Agencies to observe installation and provide all necessary material testing related to the work of this Section.
1. Earthwork activities shall be observed on a full-time basis, unless otherwise approved by the Owner's Geotechnical Engineer.
 2. The Special Inspector shall prepare and submit daily reports summarizing the construction and material testing. Reports shall include descriptions and sketches of the work performed to clearly document plan locations and elevations of any excavations, fill placement, and testing performed. The reports shall also include name of key personnel performing the work; job and weather conditions; equipment used; materials, dimensions, unusual conditions or other observations; and other general quantities; materials testing; etc. The Contractor shall cooperate and assist the Special Inspector(s) in the making of these records.
 3. The Special Inspector shall submit all logs and test reports necessary to facilitate any corrective design requirements by the Engineer of Record.
 4. Where work is observed to be non-conforming, the Special Inspector(s) shall immediately inform the Construction Manager and Owner's Engineer(s) of such conditions in writing. A summary of the observed non-conformance shall be issued within 24 hours. The Special Inspector(s) shall maintain a tracking log of all non-conformances and shall update the tracking log on a daily basis such that corrective measures, if required, can be facilitated in a timely fashion. The tracking log shall include such information as ID number, date opened, description of non-conformance, actions required, actions taken, and date closed.
 5. The Special Inspector shall provide all necessary certifications of the work in compliance with Building Code requirements.
- B. The Special Inspector(s) shall be provided with reasonable office space (heating, cooling, electric) onsite by the Construction Manager to conveniently prepare and maintain all necessary project records pertinent to their duties and to store equipment. At a minimum the Special Inspector shall be provided with a minimum of one desk, a locking cabinet or closet, and wireless internet access.
- C. The Contractor shall have the sole responsibility for coordinating their work with the Construction Manager to assure that all tests and inspection procedures required by the Contract Documents and the governing Building Codes are properly provided by the Special Inspector. The Contractor shall cooperate fully with the Special Inspector in the performance of his work.
- D. Materials and installed work may require testing at any time as work progresses. Allow free access to material stockpiles and facilities. Tests not specifically indicated herein may be performed at Owner's expense, as required by the Special Inspector.
- E. Retesting of rejected materials and installed work shall be Contractor's responsibility and shall be performed at their expense.
- F. The Contractor shall notify the Construction Manager and all other necessary parties at least 72 hours prior to each day of required inspection to allow for the appropriate personnel to be on the site.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- G. The role of the Special Inspector(s) shall not relieve the Contractor from any responsibility with respect to conformance to the proper workmanship, management of materials and waste, or any other requirements of the Contract Documents.

1.11 PRECONSTRUCTION MEETING

- A. Before beginning work on site, the Construction Manager will arrange a meeting to discuss coordination and scheduling. Parties to be present: Structural Engineer, Geotechnical Engineer, Environmental Engineer, Architect, Materials Testing Laboratory, Construction Manager, Excavation Contractor (and their Engineer where applicable), the Special Inspector, and the Owner. Review the earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least 3 working days prior to convening conference.
- B. Construction Manager shall prepare discussions and agreements and furnish a copy of meeting minutes to each participant.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Structural Fill:
1. The suitability of on-site soils for reuse as structural fill shall be determined by the Geotechnical Engineer and Special Inspector observing earthwork. The Contractor shall remove deleterious material and all particles larger than 4 inches in any dimension from on-site soils before reuse as structural fill. Prior to reuse of on-site soils, the Contractor shall provide analytical results as required under Section 1.5.B for review and approval.
 2. The Contractor shall acknowledge that on-site materials will require more efforts and time to control the moisture and to compact. The Contractor shall take all necessary measures (e.g., mixing with clean granular fill, cement mixing, lime mixing, scarifying, drying, etc.) to process on-site soils to achieve the optimum moisture content and compaction requirements.
 3. Imported structural fill shall consist of well graded granular soil containing not more than 15% by weight of materials finer than No. 200 mesh sieve and not more than 20% retained on a 3/4-inch sieve with a maximum particle size of 2 inches.
- B. Drainage Fill: Clean 3/4-inch gravel from a virgin quarry, meeting the requirements of AASHTO Gradation #57.
- C. General Fill: Shall have no more than 20% by weight of stones or masonry debris, containing no stones or other materials greater than 4 inches in any dimension and contain less than 40% by weight materials finer than No. 200 mesh sieve.
- D. Subbase: Subbase below concrete sidewalks shall consist of clean granular soils, crushed stone, or recycled concrete aggregate conforming to the requirements of NJDOT Densely Graded Aggregate (DGA) and the NJDEP Fill Guidance.
- E. Unsatisfactory Soils: ASTM D2487 soil classification groups MH, CH, OL, OH and PT, or a combination of these group symbols.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

1. Unsatisfactory soils also include suitable soils not maintained within suitable moisture content at time of compaction.
 - F. Fill for utility trenches shall meet the criteria given for structural fill and shall not contain sharp, angular pieces and pieces larger than 2 inches in any dimension.
 - G. Before importing fill to the site, the Contractor shall submit the source and documentation listed in Section 1.5 B for approval by the Owner's Engineer.
 - H. All fill shall be free from wood, debris, combustible materials, organic matter or any material subject to decay or disintegration.
 - I. The use of recycled concrete aggregate (RCA) as structural or general fill shall be permitted provided the RCA meets the gradation requirements above and is deemed acceptable to the Owner's Environmental Engineer.
- 2.2 GEOTEXTILES AND GEOGRID MATERIALS
- A. Filter and Stabilization Fabric:
 1. Woven geotextiles consisting of high tenacity polypropylene having an apparent opening size (AOS) ranging between the U.S. Sieve sizes 100 to 40, and a minimum weight of 10.0 oz per square yard. Mirafi HP 570 or approved equal.
- 2.3 CONCRETE MATERIALS
- A. Lean Concrete shall conform to ACI 301.
 - B. CLSM shall conform to ACI 299R.
- 2.4 OTHER MATERIALS
- A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 0.1 mm (4 mils) thick, continuously inscribed with a description of the utility, with a metallic core encased in a protective jacket for corrosion protections, detectable by metal detector when tape is buried up to 30 inches deep.

PART 3 - EXECUTION

3.1 GENERAL SITE PREPARATION

- A. Before beginning the work of this Section, the Contractor shall become thoroughly familiar with the Geotechnical Engineering Report as well as the site, site conditions, and all parts of the Work within this section.
- B. The Contractor shall furnish all labor, equipment and materials required to prepare site and to excavate all materials of whatever type encountered to the lines and grades shown on the Contract Drawings and as specified.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- C. The Contractor shall give 72 hours advance notice to the Construction Manager and Owner's Special Inspector of the impending completion of excavations so as to allow inspection of the exposed surface for pile caps, slabs and pads and review the ground water conditions in accordance with the Building Code requirements for Special Inspection.
- D. The Contractor shall obtain and pay for all necessary permits to perform the work from the appropriate authorities and agencies before the start of work. Obey all applicable local, state, and federal work safety rules and regulations.
- E. Install all necessary protection equipment and structures such as fences, signs, scaffolding, etc. before the start of work.
- F. Remove all existing structures, utilities, pavement, topsoil, vegetation, trees, shrubs, roots, debris, trash, etc. in accordance with the Contract Documents.
- G. Protect all utility lines which are to remain. The Contractor shall be responsible for any damage to utilities resulting from the Contractor's actions.
- H. Stockpile on-site materials anticipated for re-use. Care shall be taken to avoid blending with deleterious materials. Stockpiling shall comply with the requirements of the Contractor's Site Management Plan and any requirements set forth by the Environmental Engineer. Refer to Specifications 31 10 01 Material Management and Waste Disposal and 01 35 44 Unforeseen Environmental Conditions for additional details and specifications regarding handling, transportation and disposal of contaminated/hazardous materials at the site.
- I. Provide all necessary erosion and sediment control in accordance with the Contract Documents.

3.2 GROUNDWATER AND SURFACE WATER CONTROL

- A. The Contractor's groundwater control system shall be capable of maintaining dry stable subgrade conditions.
- B. Groundwater control systems shall be capable of operating on a continuous basis throughout excavation and foundation construction. The Contractor shall supply all necessary equipment including but not limited to wells, pumps and filters, headers, crushed stone, etc. The Contractor shall provide adequate backup systems in the event of equipment failure or malfunction.
- C. The Contractor's groundwater control system shall consider methods and measures necessary to reduce inflow through soils including but not limited to grouting and installation of sumps or pumping wells in an effort to minimize daily discharge quantities.
- D. The Contractor's work shall not result in damage to adjacent property. Protect adjacent property from the effects of groundwater lowering, as required.
- E. The Contractor shall monitor and record groundwater levels prior to and during any pumping.
- F. The Contractor shall be responsible for maintaining groundwater levels at least 2 feet below the levels of any excavation.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- G. Where required, the Contractor shall be responsible for all testing and obtaining all necessary discharge permits. Refer to Specifications 31 10 01 Material Management and Waste Disposal and 01 35 44 Unforeseen Environmental Conditions for additional details and specifications regarding handling, transportation and disposal of contaminated/hazardous materials at the site.
- H. Where an area of the site has been affected by inundation of water, the Contractor shall remove the water and clear any soil which has been softened or has deteriorated in strength.
- I. All pumping and dewatering shall be performed in such a manner as to avoid the movement of fines or loss of ground from below the bearing level and shall not influence the stability of surrounding areas.
- J. The Contractor shall be responsible for controlling surface water on site. Prevent surface water and subsurface or groundwater from entering excavations, from ponding on prepared subgrades, and from flooding project site and surrounding areas. Excavations shall be protected from deleterious effects of surface water accumulation. The Contractor shall grade accordingly to minimize run-off from entering and accumulating excavations. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- K. Pumping groundwater off the site shall be in accordance with all applicable local and federal regulations. The Contractor shall obtain all necessary permits to pump water off the site.

3.3 EXCAVATION

A. General Site Preparation

1. The excavation shall be unclassified and shall comprise and include the satisfactory removal and legal disposal of all materials encountered regardless of the nature of the materials and shall be understood to include miscellaneous fill, organics, topsoil, granular and cohesive soils, boulders, foundation remnants, structures, slabs, walls, utilities, pavements, curbs, piping and debris.
2. All excavation shall be properly sized and shall extend to the depths of the form and size required for the installation of the work as indicated on the Contract Drawings. When excavations for structural elements and site work have reached the required depths, the Special Inspector shall make an inspection of the conditions.
3. Excavation shall be to required elevations for the mat, pile caps or other foundation elements. Excavation shall be made to a depth that will allow installation of full depth of concrete slabs, and any subbase materials as shown on Contract Drawings or specified, plus a 1-inch tolerance. Excavation lines shall provide sufficient clearance for the proper execution of all concrete work including allowances for form work, shoring and inspection.
4. Materials that, in the opinion of the Owner's Engineer or Special Inspector, are not suitable for backfill, and any surplus earth shall be removed from the site and legally disposed of.
5. Subgrades shall be leveled off, free of standing water, snow, ice and loose materials, and graded to receive foundations, slabs, pits, pile caps, trenches, grade beams, etc. Hand-excavate to achieve final subgrade elevation as directed by the Special Inspector or Owner's Engineer.
6. Where required, waterproofing shall be installed in accordance with the Contract Drawings and Specifications.

B. Excavation for footings, mats, and equipment pads.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

1. Subgrades: Footing, mats, and equipment pad subgrades shall be approved by the Owner's Special Inspector before proceeding with the formwork, rebar or concrete placement. Bottoms of footings shall be founded on materials suitable for achieving the bearing pressures indicated on Contract Drawings and as approved by the Owner's Special Inspector.
2. Subgrade Bearing Capacity – The subgrade shall be as indicated on the Contract Drawings.
3. Subgrade of footings, mats, and equipment pads shall be level and free of loose rock, dirt, debris, standing water and frost before acceptance for placing concrete.
4. Unauthorized Excavation: When suitable bearing material is encountered at subgrade elevations shown and excavation is made to greater depth, the footings and foundation walls shall be extended to the lower elevation with concrete of the same strength used for the footing, at no additional cost to the Owner.
5. Authorized Additional Excavation: When unsuitable bearing material is encountered at subgrade elevations shown, the Owner's Special Inspector may require removal of unsuitable material and extension of footings and foundation walls.

C. Excavation for Slabs, Pile Caps and Other Structural Members

1. Subgrades of slabs, pile caps and other structural members, including framed slabs and grade beams, shall be approved by the Special Inspector before proceeding with their construction.
2. Subgrades shall consist of material that meets the allowable bearing pressure requirements indicated in the Contract Documents.
3. Subgrades shall be free of unsuitable material (fill, loose materials, organics, debris, etc.), standing water and frost as judged by the Owner's Engineer or Special Inspector.
4. Unauthorized Excavation: Excavations performed below the elevations shown or specified, shall be filled and compacted as hereinafter specified, at no additional cost.
5. Authorized Additional Excavation: Where the Owner's Engineer or Special Inspector determines that the bearing material encountered is unsuitable, remove the unsuitable bearing material as directed. The removed material shall be replaced with structural fill or concrete as directed by the Owner's Engineer or Special Inspector

3.4 GENERAL SUBGRADE PREPARATION

- A. Proofrolling shall be performed for all soil subgrades within and outside the limits of the proposed development including all adjacent site work and pavements.
- B. Proofrolling of soil subgrades shall conform to the following requirements:
 1. All soil subgrades shall be compacted in the presence of the Owner's Special Inspector.
 2. Proofrolling shall be accomplished with a minimum of six overlapping cross-rolled coverages of a smooth drum vibratory roller having a static weight of at least 5 tons or as approved by the Owner's Engineer.
 3. A vibratory trench roller having a static weight of at least 0.7 tons shall be used in confined areas as approved by the Owner's Engineer or Special Inspector. Areas inaccessible to the heavy equipment shall be compacted using a vibratory plate or jumping jack compactor as directed by the Owner's Engineer. The maximum travel speed of rollers should not exceed 1.5 mph.
 4. Vibratory or impact compaction shall not be performed on soils which are not within 2 % of the optimum moisture content as determined by ASTM D1557.
 5. Fill shall not be placed until the subgrade is approved by the Owner's Special Inspector.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

6. Soft Areas during Compaction: Areas deemed unsatisfactory due to “pumping, rutting, or heaving” shall be undercut within the limits and extent ordered by the Owner’s Special Inspector. These areas shall be replaced with an approved fill and compacted to the requirements of this Section or as directed by the Owner’s Special Inspector.

C. Approval Of Subgrade

1. After the Contractor has excavated to and graded the subgrade, the Contractor shall notify the Special Inspector.
2. If the Special Inspector determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill layer material as applicable, and as directed.
3. Proof roll subgrade as discussed previously. Do not proof roll wet or saturated subgrades.
4. Reconstruct subgrades damaged by rain or accumulated water as directed by the Special Inspector.

3.5 FILL PLACEMENT, GRADING, AND COMPACTION

- A. Filling and backfilling shall not be performed until related work has been inspected by the Special Inspector.
- B. All subgrades shall be approved by the Special Inspector and be free of water, snow, ice, wood, organics, or other deleterious materials prior to placement of any fill.
- C. Fill shall be placed such that there are no void spaces below floors, bottoms of pits, trenches, pipe haunches, pavements, etc.
- D. Fill shall not be placed against concrete elements until the concrete has obtained its specified compressive strength, unless otherwise directed by the Owner’s Engineer. Where fill is required on both sides of a wall, said fill shall be brought up simultaneously and evenly on both sides.
- E. Fill voids caused by the removal of boulders or below grade improvements, with lean concrete, CLSM, or structural fill.
- F. The Contractor shall supply and install all fill materials necessary to bring the ground surfaces to the required levels as shown on the Contract Drawings and as necessary to make the work complete.
- G. All surplus materials shall be removed from the site and legally disposed of. Should additional material be required for the placing of backfill, other than material obtained from the site, the Contractor shall obtain, deliver, and place accepted backfill material as required.
- H. Fill Placement:
 1. Systematically fill to allow maximum time for natural settlement. Do not fill over wet or spongy subgrade surfaces.
 2. Begin placement of fill and backfill at the lowest section of the area. Spread material evenly by mechanical equipment or by manual means above the approved compacted subgrade in loose lifts not exceeding 12 inches thick for material compacted by heavy machinery and 6 inches thick for material compacted by light machinery or by hand tamping.
 3. Build layers as horizontally as practical to prevent thickness of lift from exceeding that specified but provide with sufficient longitudinal and transverse slope to provide for runoff of surface water from every point.

COOPER UNIVERSITY HEALTH CARE
 COOPER UNIVERSITY HOSPITAL – TOWER A
 CAMDEN, NEW JERSEY

- I. **Moisture Control:** The moisture-density curve for the fill used shall be supplied by the Contractor as a guide in controlling moisture to achieve the required degree of compaction. If in the opinion of the Special Inspector, fill becomes too wet for the required compaction, the fill shall be dried by a method approved by the Owner’s Engineer before commencing or continuing compaction. Likewise, if in the opinion of the Special Inspector, the fill becomes too dry for the required compaction, the fill shall be moistened by a method approved by the Owner’s Engineer before commencing or continuing compaction.
- J. **Compaction:**
 - 1. The degree of compaction shall be checked by the Special Inspector and each successive lift shall not be placed or compacted until the previous lift is inspected and approved by the Special Inspector. Compact all fill to elevations and limits shown on Contract Drawings.
 - 2. Compact each lift to not less than the percentages of the maximum dry laboratory density as determined by ASTM D1557 as outlined in the table below:

Table 1 – Fill Compaction Criteria

Fill Type	Compaction
Structural Fill	At least 95% of the maximum dry density as determined by ASTM D1557
General Fill	At least 92% of the maximum dry density as determined by ASTM D1557

- K. The Contractor shall undertake trials as necessary to determine the number of passes and layer thickness required to achieve the specified degree of compaction.
- L. **Frost:** Do not place fill when either the fill or the previous lift (or subgrade) on which the fill is to be placed is frozen. In the event that any fill which has already been placed on the surface becomes frozen, it shall be scarified and recompact, or removed, to the approval of the Special Inspector before the next lift is placed. Remove or recompact any soft spots resulting from frost to the satisfaction of the Special Inspector before new fill is placed.
- M. During precipitation, the Contractor shall take measures to protect fill from becoming saturated. The Contractor shall not place or attempt to compact fill during precipitation unless approved by the Geotechnical Engineer. Any water collecting in fill areas shall be removed before fill placement.

3.6 MAINTENANCE

- A. Finished subgrades shall be verified to ensure proper elevation and conditions for construction above subgrade.
- B. Protect subgrade from excessive wheel loading during construction, including concrete trucks and dump trucks.
- C. Protect graded areas from traffic and erosion and keep free of trash and debris.
- D. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- E. 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.
- F. Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, or other finish), add backfill, 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.

3.7 FIELD QUALITY CONTROL

- A. The Owner will employ, at their own expense, an Engineer to review all laboratory test results and submitted reports specified in this Section.
- B. The Owner's Engineer will review the tests, and confirm whether or not the test specimens and results comply with the requirements of the Contract Documents, and note any deviations.
- C. The Owner's Engineer will identify when and where samples are to be obtained for the use of on-site materials. The Contractor shall collect samples, provide all necessary laboratory testing, and shall submit the required laboratory test reports to the Owner's Engineer.
- D. The Owner's Engineer will determine the conformance of materials to be used for fill.
- E. Allow Special Inspector to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- F. The Special Inspector shall test compaction of soil materials according to ASTM D6938 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- G. When Special Inspector reports that backfills, fills, or subgrades have not achieved the required degree of compaction, scarify and moisten or aerate, or remove and replace with satisfactory fill to depth required; re-compact and retest until specified compaction is obtained.
- H. The Contractor shall provide the Special Inspector with safe access at all times to all parts of the work and sites to verify material, moisture content, compaction, lift thickness, and other properties of the materials and workmanship.
- I. The Special Inspector shall take at least one field density test, performed in accordance with ASTM D6938, of each subgrade and fill layer for every 2,000 square feet, but not less than three tests in each compacted fill layer, or as otherwise required by the Owner's Engineer.
- J. The Special Inspector shall take at least one field density test, performed in accordance with ASTM D6938, for each 250 linear feet of utility trench backfill, and not less than one test for each compacted fill layer, or as otherwise required by the Owner's Engineer.
- K. The Contractor shall cooperate with the Special Inspector in the performance of the required tests and inspections.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

3.8 CLEAN-UP

- A. All excess material including earth and fill shall be removed from site and legally disposed of.
- B. All lumber, forms and metal work shall be removed immediately after completion of local areas. The Contractor shall be responsible for removal of all debris produced by work to this section from the site.
- C. Sidewalk and streets adjoining the property shall be broom cleaned and free of debris, rubbish, trash and obstructions of any kind caused by the work of this Section.

3.9 CLOSEOUT

- A. Substantial Completion Requirements:
 - 1. Provide final cleaning immediately prior to Substantial Completion inspection.
 - 2. Corrective Work:
 - a. Remove, repair, and reinstall, or restore in place damaged items.
 - b. Replace damaged materials or items with new if repair not acceptable to Architect.
 - 3. Provide product data to complete Operation & Maintenance Manuals.
 - 4. Submit executed Warranties.

3.10 WASTE MANAGEMENT

- A. Separate and dispose of waste in accordance with the Project's Waste Management Plan.

END OF SECTION

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

SECTION 311001

MATERIAL MANAGEMENT AND WASTE DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes specifications and requirements for handling and disposal of all materials leaving the site, including uncontaminated wastes and hazardous and non-hazardous contaminated wastes generated during the duration of construction.
- B. The Contractor is advised that the project site has been filled with materials of unknown environmental quality, similar to most urban areas in New Jersey. The Contractor should assume that all materials encountered during the Work (e.g., soil, groundwater, concrete) may be contaminated. Historic Fill, as defined by New Jersey Department of Environmental Protection (NJDEP), is known to be present on-site.

1.2 SCOPE OF WORK

- A. The Contractor shall provide all necessary labor, materials, equipment and perform all operations required to properly handle and classify all waste materials generated during the Work, including but not limited to soil, groundwater, and demolition debris.
- B. The Contractor shall be responsible for collecting waste characterization samples and locating appropriate disposal facilities for all wastes generated. The Contractor shall prepare and submit a Health and Safety Plan (HASP) under which its employees and subcontractors will perform the Work. The Contractor's HASP must be submitted at least two weeks prior to the start of Work. All on-site personnel that may be required to have OSHA-approved Hazardous Waste and Emergency Response (HAZWOPER) training and current annual 8-hour refresher training, must submit documentation of these credentials to the Owner and Engineer in advance of their mobilization to the site.
- C. The Contractor should assume that all materials encountered during construction (e.g., soil, groundwater, concrete) may be contaminated.
- D. The waste should be evaluated to determine its classification, and the Contractor shall facilitate disposal at an approved disposal facility.
 - 1. For the purposes of the bid, provide unit rates for the following categories of soil and concrete disposal/reuse that may be encountered at the site.
 - a. NJ Clean Fill (must meet NJDEP Migration to Groundwater Soil Remediation Standards)
 - b. Recycling/Beneficial Reuse
 - c. Solid Waste/Subtitle D Landfill (direct disposal/non-hazardous)
 - d. Subtitle C Landfill
 - 1) RCRA hazardous D008 < 25 parts per million (ppm) by Toxic Characteristic Leaching Procedure (TCLP) - lead contaminated only with no underlying hazardous constituents (UHC's) for stabilization and landfill

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

2. The Contractor is not responsible for obtaining a temporary USEPA Generator ID number for waste disposal. If necessary, a temporary USEPA Generator ID number disposal will be obtained by others.
- E. Contractor is responsible for the proper handling and disposal of wet/saturated soils. Contractor may either amend wet soils using a drying agent, utilize sludge containers, or implement an equivalent methodology. Provide unit rate to handle and dispose of soils with a high liquid content for saturated soils excavated from below water table.
- F. The Contractor shall be responsible for construction dewatering. Groundwater generated from dewatering activities may be containerized for off-site disposal and/or discharged via a New Jersey Discharge Elimination System (NJPDES) permit. The Contractor is responsible for obtaining a NJPDES permit if desired. All containerized groundwater must remain on-site and be tested prior to off-site disposal.
 1. For the purposes of the bid, provide unit rates for the following options for containerization and off-site disposal of groundwater generated from dewatering activities.
 - a. Containerization and off-site disposal of dewatered groundwater as non-hazardous waste.
 - b. Containerization and off-site disposal of dewatered groundwater as hazardous waste.
 2. If the Contractor elects to discharge dewatered groundwater via a NJPDES permit, the Contractor is responsible for obtaining the permit and for the treatment and discharge of non-hazardous dewatered groundwater, including construction and operation of the treatment system and required discharge sampling and analytical testing.
- G. Contractor will remove all wastes from the site within 90 days of the generation of such waste or prior to substantial completion, whichever comes first.

1.3 SUBMITTALS

- A. The Contractor shall include a waste handling and disposal plan.
- B. Contractor shall be responsible for preparation of all applications to selected disposal facilities for acceptance of the waste materials. Sampling in accordance with the disposal facility's pre-qualification procedures will be the responsibility of the Contractor. A copy of the completed application and disposal authorization(s) shall be forwarded to the Owner one day after completion/receipt
- C. The Contractor shall provide the Owner and the Engineer with copies of all waste classification analytical results a minimum of 10 working days prior to transporting waste materials from the site. The laboratory analytical data summary should contain a comparison of the data to applicable Federal and State standards and receiving facility permit limits. The analytical data summary should highlight any exceedances of those standards and permit limits.
- D. Prior to transportation of any waste materials from the site, the Contractor shall submit details of all proposed transporters and disposal facilities, including:
 1. All companies engaged in the collection, transportation, treatment, storage, disposal and/or brokering of waste and/or providing soil and fill recycling services in New Jersey are required to be A-901 licensed prior to engaging

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

2. Name, permits and licenses of transporters
 3. Name and location of the selected disposal facility
 4. Disposal facility permits and licenses
 5. Disposal facility approval letters and associated documentation
- E. Upon the removal of non-hazardous and hazardous wastes from the work site, the Contractor shall submit executed Bills of Lading and Waste Manifests to the owner's environmental engineer within one (1) business day. The Contractor shall ensure that all paperwork is complete and accurate. Such Bills of Lading and Waste Manifests shall contain, at a minimum:
1. Contractor's Name
 2. Contractor's Address
 3. Permit Number
 4. Quantity of Waste Removed
 5. Location, Name, and if applicable, EPA ID Number of Waste Generator Facility
 6. Name of Disposal Facility and its EPA ID Number
 7. Disposal Facility Address
 8. Date Removed from Work Site
 9. Signature of Driver
 10. Signature Receipt by Disposal Facility
- F. Submit a Decontamination Plan that includes at a minimum:
1. A description of decontamination procedures and proposed solutions
 2. The location of the decontamination pad
 3. Waste management procedures
- 1.4 RELATED SECTIONS
- A. The general provisions of the Contract, including without limitation all terms and conditions of the Contract, all Drawings, all Specifications, are incorporated into this Section and are part of this Section.
- 1.5 REFERENCE STANDARDS
- A. All Work and materials under this section shall conform to the latest revision of the following standard specifications, where not otherwise required by the contract documents:

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

1. N.J.A.C. 7:26E – Technical Requirements for Site Remediation
2. NJDEP Field Sampling Procedures Manual, March 2024
3. Relevant NJDEP Contaminated Site Remediation & Redevelopment (CSRR) Program Technical Guidance Documents
4. 40 CFR Part 260 – Hazardous Waste Management System: General
5. 40 CFR Part 761 – PCBs Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
6. ASTM D-5088-62 “Decontamination of Equipment”.
7. ASTM D-5088-20 “Standard Practice for Decontamination of Field Equipment Used at Waste Sites”.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. The Contractor shall use waste containers, rail cars, dump and/or tank trucks conforming to all applicable state and federal transportation regulations.
- B. Contractor is responsible for any site-related improvements necessary to allow required transportation to be utilized.
- C. All trucks and/or containers used to transport contaminated waste materials must be conforming to all applicable state and federal transportation regulations. The trucks and/or containers must be securely covered prior to exiting the site. Trucks carrying liquids or wet soils must be of watertight body construction.

PART 3 - EXECUTION

3.1 MATERIAL HANDLING AND MANAGEMENT

- A. If contaminated soil is encountered, soil shall be segregated from non-contaminated soil and stockpiled on 20-mil polyethylene plastic sheeting and covered with the same. The Contractor shall provide adequate means to secure the polyethylene plastic sheeting so that the stockpiled soil remains fully covered. The Contractor is responsible for the maintenance of the plastic sheeting and is required to repair or re-cover the stockpiled soil as necessary.
- B. The Contractor shall obtain all necessary permits for dewatering and handling encountered groundwater. The Contractor is responsible for testing any water or liquid encountered in the excavation to determine proper dewatering and disposal or discharge requirements.

3.2 WASTE CHARACTERIZATION

- A. Collection and laboratory analyses of all waste characterization samples shall be coordinated and paid for by the Contractor.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

1. Characterization of all waste materials shall be in accordance with the most current NJDEP and USEPA guidance, regulations and waste characterization procedures and the specific requirements of the selected disposal facility.
 2. If soils are proposed for on- or off-site reuse as NJDEP Clean Fill, characterization must be conducted in accordance with NJAC 7:26E and the NJDEP's most recent regulations and guidance, including the Fill Material Guidance for SRP Sites (currently, Version 4.0, dated October 2021). At a minimum, clean fill sampling shall be conducted in accordance with the default clean fill sampling frequency noted in the Fill Material Guidance for SRP Sites (Section 6.2.2 – Table 2) and include laboratory analysis for required parameters, including, but not necessarily limited to, the Target Analyte List/Target Compound List (TAL/TCL+30) and Extractable Petroleum Hydrocarbons (EPH) for all samples. All samples shall be discrete samples.
 3. All sample collection and handling procedures, preservation methods and analytical requirements shall be in accordance with N.J.A.C. 7:26E and all applicable NJDEP regulations and guidelines.
 4. All sample analyses shall be performed by laboratories certified by NJDEP to perform the relevant analytical methods established by the USEPA.
- B. The Contractor shall provide copies of all waste characterization and waste profile documentation as described in the Submittals section.

3.3 WASTE DISPOSAL

- A. The Contractor shall be responsible for locating appropriate disposal facilities and coordinating the safe legal transportation and off-site disposal of all waste material generated throughout the duration of the Work.
1. All disposal facilities and transportation companies coordinated and used by the Contractor must be fully licensed and/or permitted and insured as required by local, state and federal regulations governing the facility.
- B. No wastes generated during excavations shall be removed from the Site until all necessary waste characterization sampling and analyses have been completed.
- C. The Contractor shall be responsible for labeling hazardous and non-hazardous materials containers with labels conforming to Federal, State and local regulations. The Contractor shall ensure that all vehicles used to transport contaminated waste materials are appropriately labeled as well.
- D. The Contractor shall prepare all necessary manifests for transportation and disposal of the waste materials.
- E. No vehicle transporting contaminated waste materials will be permitted to leave the site until it is logged out by the Engineer.
- F. Upon the removal of non-hazardous and hazardous wastes from the work site, the Contractor shall submit Bills of Lading and Waste Manifests to the Owner and the Engineer.

END OF SECTION

THIS PAGE INTENTIONALLY BLANK

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

SECTION 316316

AUGERED CAST-IN-PLACE (ACIP) PILES

PART 1 - GENERAL

1.1 SUMMARY

A. The Work of this Section includes, but is not limited to the following:

1. Layout of field locations of the piles in accordance with the Contract Documents.
2. Design of all augered cast-in-place (ACIP) piles. The Contractor shall design the ACIP piles to meet the performance requirements specified herein or shown on the Contract Drawings. Design shall include size, length, grout or concrete strength, reinforcing, and deformation analysis.
3. Furnish and install all ACIP piles including all materials, products, accessories, tools, equipment, services, transportation, labor and supervision, and manufacturing techniques required for design, installation and testing of ACIP piles and pile top attachments.
4. Perform two each successful compression, tension and lateral pile load tests. Chipping piles to the required cut-off elevations as indicated on the Contract Drawings. Stockpiling, transporting, and legal off-site disposal of augered soils, waste grout and/or concrete, and pile cut-off remnants.
5. Provide as-built pile location survey and identification plan.
6. Protection of adjacent structures, utilities, sidewalks, and pavements.
7. Temporary groundwater control as required for execution of the work of this Section.
8. All other labor, equipment, and materials as may be reasonably inferred to be required to make the Work under this Section complete.

1.2 RELATED SECTIONS AND DOCUMENTS

A. The general provisions of the Contract, including without limitation all terms and conditions of the Contract, all Drawings, all Specifications, are incorporated into this Section and are part of this Section.

1.3 REGULATORY REQUIREMENTS

- A. General: Except as modified or voided by requirements specified herein or by details or notes included in the Contract Drawings, the Work specified under this Section shall conform to all applicable provisions of the codes, specifications, standards and other reference documents cited in this Specification and/or noted in the Contract Drawings.
- B. Codes: All Work under this Section shall conform to the most restrictive requirements of the New Jersey edition of the International Building Code, and to the regulations of all governmental authorities having jurisdiction.
- C. American Society for Testing and Materials (ASTM) standards, latest edition.
1. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 2. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

3. ASTM C33 Standard Specifications for Concrete Aggregates
 4. ASTM C94 Standard Specification for Ready-Mixed Concrete
 5. ASTM C109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars
 6. ASTM C150 Standard Specification for Portland Cement
 7. ASTM C494 Standard Specification for Chemical Admixtures for Concrete
 8. ASTM C937 Standard Specification for Grout Fluidifier for Preplaced-Aggregate Concrete
 9. ASTM D1143 Standard Test Methods for Deep Foundation Elements Under Static Axial Compressive Load
 10. ASTM D3966 Standard Test Methods for Deep Foundations Under Lateral Loads
 11. ASTM D3689 Standard Test Methods for Deep Foundations Under Static Axial Tensile Load
 12. ASTM D5882 Standard Test Method for Low Strain Integrity Testing of Deep Foundations
 13. ASTM D7949 Standard Test Methods for Thermal Integrity Profiling of Concrete Deep Foundations
- D. United States Army Corp of Engineers (USACE) Publications
1. CRD-C619 Grout Fluidifier for Preplaced – Aggregate Concrete
- E. ACI-301 – Specification for Structural Concrete
- F. ACI-318 – Building Code Requirements for Structural Concrete, latest edition.
- G. ACI-299R – Controlled Low Strength Materials, latest edition.
- H. Concrete Reinforcing Steel Institute (CRSI) Standards
- I. American Welding Society (AWS) D1.4 – Structural Welding Code – Reinforcing Steel
- J. FHWA Geotechnical Engineering Circular (GEC) No. 8 – Design and Construction of Continuous Flight Auger Piles (2007). Report No. FHWA-HIF-07-03
- K. Deep Foundations Institute (DFI)
1. Augered Cast-in-Place Piles Manual, Third Edition, with 2023 Errata
 2. Guideline for Interpretation of Nondestructive Integrity Testing of Augered Cast-in-Place and Drilled Displacement Piles (2012)
- Augered Cast-in-Place Piles Inspector’s Guide, Second Edition, 2010
- L. Geotechnical Report: The Geotechnical Engineer engaged by the Owner (Owner’s Engineer / Owner’s Geotechnical Engineer) has prepared a report entitled *Geotechnical Engineering Report for Cooper University Health Care – Master Campus Plan*, prepared by Langan Engineering and Environmental Services, LLC (9 July 2024). Copies of the report are available to the Contractor for reference. Borehole, cone penetration test (CPT) and other in situ test logs are made available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between exploration locations. The Owner will not be responsible for interpretation conclusions drawn from this data by the Contractor.
- M. The Contractor shall comply with all the laws, ordinances, codes, rules and regulations of the Federal, State and Local authorities having jurisdiction over any of the work specified herein.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- N. Where reference is made to one of the above standards, the revision in effect at the time of the bid opening shall apply.
- O. In case of conflict between regulations and specifications, the Contractor shall comply with the most stringent requirements outlined in the applicable codes, regulations, and specifications.
- P. Nothing in this section shall relieve Contractor of their responsibility of providing a higher standard than the relevant Code or Standard to comply with this Specification.

1.4 DEFINITIONS

- A. Contractor: The person/firm responsible for performing the ACIP pile work.
- B. Creep Movement: The movement that occurs during the creep test of a pile under constant load.
- C. Design Load (DL): Anticipated final maximum service load on the pile.
- D. ACIP Pile: a deep foundation element that is constructed by rotating a hollow-stem auger into the ground to a specified depth. Grout or concrete is injected through the auger shaft under continuous positive pressure, as the auger is being withdrawn. Reinforcing steel, as specified, is inserted into the column of fluid grout or concrete following completion of grout or concrete placement.
- E. Residual Movement: The non-elastic (non-recoverable) movement of a pile measured after load testing.

1.5 ACIP PILE DESIGN REQUIREMENTS

- A. The Contractor shall design the ACIP piles to meet the specified loading conditions, as shown on the Contract Drawings and approved shop drawings.
- B. Design the ACIP piles and pile top to footing connections using the procedures contained in the FHWA *Design and Construction of Continuous Flight Auger Piles* Geotechnical Engineering Circular (GEC) No. 8 and the New Jersey Edition of the International Building Code.
- C. The required factors of safety shall be in accordance with the New Jersey Edition of the International Building Code or as specified herein.

1.6 SUBMITTALS

- A. Unless otherwise indicated, transmit all submittals to the Construction Manager for review. Review of submittals by the Construction Manager, Owner's Architect, and Owner's Engineers is required before proceeding with ordering, fabricating, or any work of this Section. Submittal review will be of concept only and shall not in any way diminish or limit Contractor's responsibility for the quality and performance of their work. All material orders are the sole responsibility of the Contractor.
- B. The Contractor shall prepare and submit working drawings and relevant structural design calculations for the ACIP pile system or systems. Such drawings and calculations shall be submitted a minimum of 15 working days before planned start of construction. All design submittals shall be sealed by a registered Professional Engineer, licensed in New Jersey.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- C. Work shall not begin until the appropriate submittals have been received and reviewed by the Owner and Owner's Engineers. Note that any additional time required because of incomplete or unacceptable submittals shall not be cause for delay or impact claims. All costs associated with incomplete or unacceptable submittals shall be the responsibility of the Contractor.
- D. The Contractor shall submit design calculations for all ACIP piles including, but not limited to:
1. A written summary report that describes the overall ACIP pile design
 2. Applicable code requirements and design references
 3. ACIP pile structure design cross-section(s) geometry including soil strata and piezometric levels and location, magnitude and direction of design applied loads.
 4. Design criteria including soil shear strengths (friction angle and cohesion), unit weights, and grout-to-ground bond values.
 5. ACIP pile diameters
 6. Factors of safety and allowable stresses used in the design.
 7. Design calculations
 8. Design notes including an explanation of any symbols and computer programs used in the design.
 9. Pile to cap connection calculations.
- E. The Contractor shall prepare and submit working drawings and relevant design calculations for the ACIP piles. Such drawings and calculations shall be submitted a minimum of 15 working days before planned start of construction. All design submittals shall be signed and sealed by a Professional Engineer licensed in New Jersey.
1. Calculations shall include check of combined bending, and the effects of accidental eccentricity caused by construction of piles not installed at the design location for single or two-pile caps.
- F. The Contractor shall submit mix designs, vendor information, materials test data and reports and any other pertinent product data for all proposed grout and concrete fill including but not limited to: grout, structural concrete, lean concrete, and controlled low strength materials (CLSM). All concrete fill mix designs shall be prepared by a Professional Engineer licensed in New Jersey. Include supplier's maximum recommended time to place grout and concrete after batching.
- G. The Contractor shall submit pile reinforcing steel manufacturer's and/or supplier's certificate certifying pile materials conform to the requirements specified in this Section and in the Contract Documents including but not limited to certified mill test reports covering physical and chemical tests. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, spacing, splices and laps, mechanical connections, tie spacing, hoop spacing, quantities of each bar type, quantities and location of all related hardware and supports for concrete reinforcement.
1. Reinforcing Steel Placing Drawings shall be prepared in accordance with the requirements of ACI 315R-18, "Guide to Presenting Reinforcing Steel Designs." The Placing Drawings shall show all information necessary to fabricate and place the reinforcing steel without reference to the Contract Drawings and Specifications. Placing Drawings that do not show the sufficient information to place the reinforcing steel will be rejected.
- H. Welding Certificates: Submit for Record.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- I. The Contractor shall submit means and methods for installing the piles to meet the requirements of these specifications including a complete description of the pile installation equipment and identification of pile, grout/concrete, and reinforcement. Specifically include:
1. Step-by-step description of pile installation procedures.
 2. Target drilling and grouting parameters with acceptable tolerances for pile installation including auger rotation speed, drilling penetration rates, torque, applied crowd pressures, grout pressures, and grout volume factors.
 3. Details of reinforcement placement including support for reinforcing cages at the top of the pile and methods for centering the cages within the grout or concrete column.
 4. Equipment and procedures for monitoring and recording grout or concrete pressures and volumes during installation including automatic monitoring equipment.
 5. Contingency plans for equipment failures during drilling or grouting.
 6. Means for calibration of grout or concrete pump.
 7. Catalog cuts and manufacturer's literature for all equipment.
- J. Load Tests
1. Submit load test procedures including drawings showing the layout of load frame, reference frame, and reaction piles.
 2. Submit identification numbers and calibration curves for the hydraulic jacks and pressure gauge.
 3. Submit identification numbers and calibration curves for all load and displacement monitoring equipment including load cells, dial gages, certificates of strain gauge, readout box calibration, etc.
 4. Submit manufacturer's product data sheets for all electronic data collection devices.
 5. Submit all electronically recorded data (where applicable) for review and evaluation by the Special Inspector and Engineer of Record. Data shall identify all necessary calibration factors and shall include time stamps for all records. Data shall be provided in digital format suitable for use with MS Excel. Electronic data shall be inclusive of all any load cells, strain gages, and LVDT recordings made during execution of load tests. The data shall be provided within 48 hours of collection.
- K. The Contractor shall submit means and methods for setup and completion of non-destructive integrity testing including thermal integrity testing and sonic echo-impulse response integrity testing.
- L. Plans and Surveys:
1. Submit a ACIP Pile Identification Plan, developed from the Foundation Plans, identifying all the piles to be installed with unique nomenclature.
 2. Plans shall identify locations of load tests, reaction piles, indicator piles, and thermal integrity tests for review and approval by Owner's Structural and Geotechnical Engineers.
 3. The Contractor shall provide the Owner's Engineers with an as-built survey ~~a minimum~~ after completion of 25%, 50%, 75% and 100% of the proposed piles for a minimum of four surveys. The surveys shall be prepared by a Professional Surveyor, licensed in New Jersey. As-built survey data shall also be submitted in tabular digital format (MS Excel) and shall include:
 - a. Pile number
 - b. Northing and Easting at intended pile center line.
 - c. Deviations referenced to the Northing and Easting.
 - d. Pile plumbness (%)

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- e. All deviations and plumbness shall be reported at pile cut-off elevation.
- 4. After the completion of the installation work, the Contractor shall submit a survey plan showing all numbered pile locations, including locations of all abandoned piles and their replacements, if any. The Contractor shall provide additional surveys of a pile or pile groups, at no extra cost to the Owner, if required by the Engineer.
- M. Acceptance of the installation equipment and procedures does not relieve the Contractor from the responsibility of properly installing piles in satisfactory conditions, to the specified criteria, to achieve the design capacities.
- N. Drilling Records: Drilling records shall be submitted no later than 48 hours after drilling each pile. The drilling records shall include:
 - 1. Pile location.
 - 2. Ground surface elevation.
 - 3. Pile tip depth and elevation.
 - 4. Pile length.
 - 5. Auger diameter and inclination.
 - 6. Description of equipment and tools.
 - 7. Details of the reinforcing steel (number, size, and grade of longitudinal bars, size and spacing of transverse steel, use of centralizers, splice locations, diameter and length of cage).
 - 8. Name of pile contractor and concrete/grout supplier.
 - 9. Grout/concrete batch number, mix ratio used, type of Portland cement.
 - 10. Volume of grout place or slump and volume of concrete placed.
 - 11. Top of pile conditions including any debris present.
 - 12. Depth to which reinforcing steel was placed.
 - 13. Date and time of all drilling and grouting activities.
 - 14. Identification of all grout or concrete samples taken.
 - 15. Description of subsurface conditions including soil strata, depth to groundwater, and any obstructions.
 - 16. Drawing showing all field modifications and actual in-place installation of all work constructed or installed under this section.
 - 17. All automated measurements collected during installation including auger rotation versus depth for every 2 feet increment, volume of grout or concrete versus depth for every 2 feet increment, average minimum and maximum pump stroke pressures at the ground surface and near the auger surface for every 2 feet increment, and torque and crowd force for every 2 feet increment.
 - 18. Out of tolerance pile survey showing deviation of installed pile centroid from design location in the two orthogonal directions of the pile cap.
 - 19. Remarks such as unusual conditions encountered or non-standard drilling practices.
- O. The Contractor shall submit report of integrity test results within 48 hours after testing. The report shall include calculated pile diameter versus depth.
- P. The Contractor shall submit statement of qualifications for all load test and integrity testing personnel, including supervisory personnel, education, specific qualifications relevant to the Project and attaching copies of all certificates for the individual.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- Q. Substitutions: Should the Contractor desire a substitution from the Contract Drawings or specifications, the Contractor shall submit the specific substitution in writing before submittal of Shop Drawings. Requests for substitutions shall be submitted on the Contractor's letterhead. Approval of the Contractor's request for substitutions shall be at the discretion of the Owner and Owner's Engineers. Rejection of substitutions shall not be grounds for an adjustment to the contract price.
- R. All required certifications and permits pertaining to the work of this Section.
- S. Certification for Examination of Site and Records: Before proceeding with the Work, submit certification in an acceptable form, signed by the Contractor, stating that careful examination has been made of the site, existing structures, existing adjacent structures, records of utility lines, test boring records, soil samples, subsurface exploration reports, the Contract Drawings, and all other Contract Documents.

1.7 PROJECT CONDITIONS

- A. Subsurface Conditions: The subsurface conditions at the site are generally characterized by a layer of uncontrolled fill containing demolition debris over an upper sand and silty sand, clay and silt with organics, and a lower dense sand. Groundwater is estimated to be about elevation 3 to 3.6 feet (NAVD88). Additional details pertaining to the subsurface conditions are presented in the *Geotechnical Engineering Report*, prepared by Langan Engineering and Environmental Services (9 July 2024). This information is provided for the Contractor's information only.
- B. Borehole and cone penetration test (CPT) logs are available for the Contractor's review. The Owner makes no predictions or representations regarding the character or extent of soil, groundwater, or other subsurface conditions to be encountered during the work. The Contractor shall make their own deductions of the subsurface conditions which may affect the methods or cost of construction of the work hereunder and agrees that he will make no claims for damages or compensations, except as are provided under the agreement, should he find conditions during the progress of the work different from those as calculated or anticipated by him.
- C. The Contractor, by careful examination, shall inform himself as to the nature and location of the work; the conformation of the ground and the nature of the subsurface conditions; the locations of the groundwater table; the character, quality and quantity of the materials to be encountered; the character of the equipment and facilities needed prior to and during the execution of the work; and all other matters which can be in any way effect the work.
- D. The Contractor shall investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to, ingress and egress of the site of the work. The Contractor shall conform to all Camden, State, and Federal regulations regarding the transportation of materials to and from and at the site and shall secure in advance such permits as may be required.
- E. Examine drawings to determine sequence of operations, and relation to work of other trades. Start of work will signify acceptance of field conditions and will acknowledge coordination with other trades.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

1.8 EXISTING UTILITIES

- A. Locate existing underground utilities in and beyond the areas of work. If utilities are indicated to remain in place, provide adequate means of support and protection during the work. Utilities scheduled for relocation are identified in the Contract Documents. Procedures for utility clearance are included in the Contract Documents.
 - 1. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult utility owner immediately for direction. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 - 2. Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by the Construction Manager and then only after acceptable temporary utility services have been provided. Provide minimum of 48-hour notice to the Construction Manager, 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.

1.9 PROTECTION

- A. The work shall be executed so that no damage or injury will occur to the existing public and adjoining or adjacent structures, streets, paving, sewers, gas, water, electric or any other utilities. Should any damage or injury caused by the Contractor, or anyone in Contractor's employ, or by the work under this Contract occur, the Contractor shall, at their own expense, repair such damage and shall assume all responsibility for such injury.
- B. The above shall also include the protection of all existing utilities (including sewers, water lines, electrical lines, telecommunication lines, etc.) to remain in use within and adjacent to the area affected by the work of this Contract.
- C. Monuments, benchmarks, monitoring points, and other reference features on streets and structures in the work area shall be protected. Should these be disturbed in any manner, they shall be reset by a Professional Land Surveyor, at the Contractor's expense.
- D. While performing work of this Section, or any other related Section, the Contractor shall take care that their operations do not adversely affect the stability and integrity of existing buildings and structures in the vicinity, or induce settlement in them.
- E. Provide barricades, warning lights, barriers, etc., to prevent accidents, avoid all necessary hazards and protect the public, the work and property at all times, including Saturdays, Sundays and Holidays.
- F. Provide protection to sidewalks and pedestrians as required.
- G. Erosion and sediment control and dust control shall be in accordance with the Contractor's Site Management Plan.

1.10 QUALITY ASSURANCE

- A. Materials and work shall conform to the latest edition of reference standards specified herein and to applicable codes and requirements of local authorities having jurisdiction.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

B. Contractor Qualifications.

1. The Contractor shall furnish all necessary plant, materials, skilled labor, and supervision to carry out the contract and to provide efficient and satisfactory ACIP pile installation. The Contractor performing the work of this Section shall be a qualified foundation contractor with at least 5 years of relevant field experience on projects of similar size, scope, and complexity and have successfully constructed at least five projects in the last 5 years totaling at least 300 ACIP piles of similar capacity to those required in these Contract Documents.
2. The Contractor must provide resumes of key personnel who will be present on-site (and will be materially involved) and who will each have at least 3 years of relevant experience. These personnel include superintendent, driller, and project engineer/manager.
3. The Contractor shall retain the services of a Licensed Professional Engineer licensed in New Jersey who shall design the ACIP piles. The Contractor's Professional Engineer shall sign, seal and submit all relevant forms for regulatory filings.

C. The Contractor shall engage and assign survey and monitoring work of this section to a Profession Land Surveyor licensed in New Jersey. The results of all monitoring work of this Section shall be made immediately available to the Contractor's Professional Engineer responsible for the design supervision of the work specified herein.

D. The Contractor shall not sublet the whole or any part of the contract without the express permission in writing of the Owner.

1.11 QUALITY CONTROL – INSPECTION AND TESTING

A. Special Inspection: The Owner shall engage, under the requirements of Section 1704 and 1705 of the New Jersey edition of the International Building Code, one or more Special Inspection Agencies to observe installation and provide all necessary material testing related to the work of this Section.

1. ACIP pile activities shall be observed on a full-time basis, unless otherwise approved by the Owner's Geotechnical Engineer.
2. The Special Inspector shall observe drilling, steel reinforcement placement, steel reinforcement welding, grout and concrete delivery at the site, grout and concrete placement, and curing procedures including maintenance of curing temperatures.
3. The Special Inspector shall submit the installation record of each pile no later than 3 days after installation is complete. The installation record shall include, but not be limited to the project name and number, the name of the Contractor, the name of the Special Inspector, the date of pile installation, the pile identification number, the ground surface elevation, the completed pile length, the pile tip elevation, the theoretical grout volume, the actual volume of grout placed, the grout factor, the amount and configuration of the reinforcing steel placed, and any unusual occurrences during pile installation.
4. The Special Inspector shall log the conditions during all pile load tests and shall prepare a load test report for submittal to the Contractor's Engineer, Owner and Owner's Engineers.
5. The Special Inspector shall prepare and submit daily reports summarizing the ACIP pile construction, materials, material tests, and load tests. Reports shall include descriptions and sketches of the work performed to clearly document plan locations and elevations of any ACIP piles and tests performed.
6. The Special Inspector shall submit all ACIP pile logs and test reports.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

7. Where work is observed to be non-conforming, the Special Inspector shall immediately inform the Construction Manager, Contractor's Engineer and Owner's Engineers of such conditions in writing. A summary of the observed non-conformance shall be issued within 24 hours. The Special Inspector shall maintain a tracking log of all non-conformances and shall update the tracking log daily such that corrective measures, if required, can be facilitated in a timely fashion. The tracking log shall include such information as ACIP pile ID number, date the non-conformance report is opened, description of non-conformance, actions required, actions taken, and date closed.
8. The Special Inspector shall provide all necessary certifications of the work in compliance with Building Code requirements.
9. The Special Inspector(s) shall be provided with reasonable office space (heating, cooling, electric) on-site by the Construction Manager to conveniently prepare and maintain all necessary project records pertinent to their duties and to store equipment. At a minimum the Special Inspector shall be provided with a desk, a locking cabinet or closet, and wireless internet access.
10. The Contractor shall have the sole responsibility for coordinating their work with the Construction Manager to assure that all tests and inspection procedures required by the Contract Documents and the governing Building Codes are properly provided by the Special Inspector. The Contractor shall cooperate fully with the Special Inspector in the performance of their work.
11. ACIP Pile installation work shall not be done without the presence of the Owner's Special Inspector. The presence of the Special Inspector does not relieve the Contractor from the responsibility of satisfactorily constructing piles meeting the load bearing requirements specified herein and maintaining the integrity of piles during the work.
12. Materials and installed work may require testing at any time as work progresses. Allow free access to material stockpiles and facilities. Tests not specifically indicated herein may be performed at Owner's expense, as required by the Special Inspector.
13. Retesting of rejected materials and installed work shall be Contractor's responsibility and shall be performed at their expense.
14. The Contractor shall notify the Construction Manager and all other necessary parties at least 72 hours before each day of required inspection to allow for the appropriate personnel to be at the site.
15. The Contractor shall cooperate with the Special Inspector to facilitate the progress of the work. If the Contractor fails to cooperate, the Owner shall have the right to suspend further work until the situation is remedied.
16. The role of the Special Inspector(s) shall not relieve the Contractor from any responsibility with respect to conformance to the proper workmanship, management of materials and waste, or any other requirements of the Contract Documents.

1.12 PRECONSTRUCTION MEETING

- A. Before beginning work on site, the Construction Manager will arrange a meeting to discuss coordination and scheduling of ACIP pile construction. Parties to be present: Structural Engineer, Geotechnical Engineer, Environmental Engineer, Architect, Testing Laboratory, Construction Manager, ACIP Pile Contractor and their Engineer, the Special Inspector, and the Owner. Review the ACIP pile installation procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least 5 working days prior to convening meeting. Construction Manager shall record discussions and agreements and furnish a copy to each participant.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

PART 2 - PRODUCTS

2.1 GROUT AND CONCRETE

- A. Materials shall conform to the following:
1. Portland Cement: ASTM C150, Type II
 2. Fluidifier: U.S. Army Corps of Engineers Specifications CRD-C619 and ASTM C937
 3. Retarder: ASTM C494, Type A or Type D
 4. Water: Fresh, clear, and free of injurious amounts of oil, acid, salts, or organic matter
 5. Fine and Coarse Aggregates: ASTM C33
 6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- B. Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened grout. Do not use calcium chloride or admixtures containing calcium chloride.
- C. The grout or concrete used shall consist of a mixture of Portland cement, fluidifier, retarder, fine and/or coarse aggregate and water so proportioned and mixed as to produce a grout mix capable of being pumped. The pile grout or concrete shall have a minimum 28-day compressive as specified on the Contract Drawings. Mixing time after adding the fluidifier at the site shall be no less than three minutes. The grout or concrete shall be mixed in accordance with the applicable requirements of ASTM C94 and ACI 301.
1. Do not air entrain grout or concrete for piles.
 2. Limit total water-soluble, chloride-ion content in hardened grout or concrete to 0.15% by weight of cement.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless approved by the Owner's Geotechnical and Structural Engineers.
- D. The Contractor shall not use any grout or concrete older than the preapproved maximum time specified by the supplier. If the pre-approved maximum time limit exceeds 90 minutes, the supplier shall provide adequate documentation, indicating that the grout or concrete does not become detrimentally affected beyond this general local industry accepted standard time limit. The Contractor shall coordinate their grout or concrete delivery to meet the above requirement and to assure continuity of the Work.
1. Grout or concrete shall not be placed when the grout or concrete temperature falls below 40 degrees Fahrenheit or exceeds 100 degrees Fahrenheit, unless approved procedures for cold or hot weather placement are followed. Protect grout from physical damage or reduced strength, which could be caused by frost, freezing action, or low temperatures or from damage during high temperatures in accordance with ACI 305/306. When the ambient temperature reaches or is approaching freezing point, hot water will be used in the batching process. All exposed grout surfaces will be protected with insulation blankets.
 2. When air temperature is between 85 and 90 degrees Fahrenheit, reduce mixing and delivery time to 75 minutes; when air temperature is above 90 degrees Fahrenheit, reduce mixing and delivery time to 60 minutes.
 3. Plant Batched Ready-Mixed Grout and Concrete: Measure, batch, mix, and deliver grout according to ASTM C94/C94M and furnish batch ticket information including project name, date, mixture type, plant departure time, discharge time, mixing time and quantity.
 4. Do not add water to grout mix after initial plant mixing.
 5. Project site mixing is not permitted.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- E. The grout or concrete shall be sampled and tested by an independent testing laboratory (Testing Agency) retained by the Owner.
1. During test pile installation, the Testing Agency shall sample and cast of a set of six 2-inch cubes for grout or a set of six 6-inch cylinders for concrete from each truck of material delivered to the site.
 2. During production pile installation, a set of six 2-inch cubes for grout or a set of six 6-inch cylinders for concrete shall be made twice a day but not less than one set for every 50 cubic yards of material delivered to the site.
 3. For each set, one specimen shall be tested at 7 days, one at 14 days, and two at 28 days. Two specimens shall be kept as a reserve in case of low strength results. If the 28-day specimen breaks at strength greater than or equal to the required, then the last two specimens shall also be tested at 28 days. If not, the last two specimens shall be tested at 56 days.
- F. Grout cubes shall be made and tested in accordance with ASTM C31 and C109. Concrete cylinders shall be made and tested in accordance with ASTM C31 and C39. The test results shall be submitted to the Owner and the Owner's Engineer for review within three days of completion of the testing. Reports of compressive-strength tests shall contain Project identification name and number, date of grout placement, name of testing and inspecting agency, pile locations in which grout was placed, design compressive strength at 28 days, mixture proportions and materials, compressive strength, and type of break for all tests.
1. Compressive strength is acceptable if the arithmetic average of any three consecutive 28-day compressive strength tests equals or exceeds the specified compressive strength and if no single compressive strength test result is more than 500 psi below the specified compressive strength.

2.2 STEEL

- A. Steel Reinforcement shall conform to ASTM A615 Grade 75 or ASTM A722 Grade 150 and be of the size and quantity shown on the Contract Drawings.
- B. The Contractor shall provide a design for the steel reinforcement to be installed in the piles. The minimum reinforcement configuration for the piles shall consist of a single vertical bar extending the full length of the pile, combined with a reinforcing steel cage in the upper part of the pile that is subject to shear and moment forces. Adequate pile reinforcing must be designed to resist all axial, combined bending, tensile, and shear stresses. Reinforcing steel design drawings and calculations shall be prepared by a Professional Engineer licensed in New Jersey and submitted to the Owner's Structural Engineer and Geotechnical Engineer for review and approval.
- C. The piles shall have the reinforcing steel cages as designed for the ACIP pile capacities specified on the foundation plans prepared by the Owner's Structural Engineer. Additional reinforcement might be necessary, if determined from field load tests, to sustain uplift and lateral loads.
- D. Steel cages shall have preapproved spacers to maintain the cages centered within the pile shaft.
1. The spacers shall be located at the tip, top, and middle of the reinforcing steel cages. Additional spacers shall be located not more than 15 feet on-center for the fully embedded length of the center bar below the reinforcing cage.
 2. The spacers shall be attached to prevent bending before placement in the pile, and shall be approved by the Owner's Geotechnical Engineer before use.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

3. The size of the spacers shall be such that the minimum grout cover specified on the Contract Drawings is maintained inside the pile.
 4. Centralizers shall be fabricated from plastic, steel, or material that is non-detrimental to the reinforcing steel and which allow free flow of grout around centralizer. Wood shall not be used.
- E. Steel cages shall be properly and securely fabricated such that the steel bars and ties maintain their designed locations and configurations.
1. Fabricate steel reinforcement according to the Concrete Reinforcing Steel Institute (CRSI) Standards
 2. Splice reinforcing steel where indicated or where required using tension lap splices of lengths as indicated on the Contract Drawings.
 3. Mechanical couplers shall be capable of achieving the design loads of the parent threadbar material.
- F. The reinforcing steel cages shall be fabricated and stored in orderly groups to minimize bending or damage before installation. Keep reinforcing cages free of soil or other materials to avoid contaminating the piles.
- G. Delivered materials shall be subject to the inspection and approval of the Owner's Engineers, Special Inspector(s) and Testing Agency, before use.
- 2.3 TEMPORARY STEEL CASINGS
- A. Corrugated-Steel Pipe Casings: ASTM A929/A929M, steel sheet, zinc coated.
- 2.4 EQUIPMENT
- A. The grout/concrete pump shall be a positive displacement piston pump capable of developing sufficient displacement pressures to assure the continuous and complete filling of the augered pile shafts.
1. A screen shall be placed at the pump outlet to remove oversized particles and cement lumps.
 2. All oil, rust inhibitors, and solvents shall be completely removed from pumps and other grout/concrete handling equipment.
 3. The pump shall be equipped with an automatic stroke counter. Before any pile installation Work, the Contractor shall field-calibrate the pump discharge capacity in strokes per cubic foot following a method approved by the Owner's Geotechnical Engineer before the first use of the pump, once per week during production pile installation, and after any adjustments.
 4. Grout and other material used to prime the pump or other equipment shall not be placed in the piles and shall be disposed of as waste material.
 5. The contractor shall have on hand a spare counter and a spare pump. The spare pump shall be used when the primary pump is not functioning properly and when agreed upon with the Special Inspector.
- B. A pressure transducer shall be provided at the top of the hollow stem for measurement of real time grout pressure. Pressure transducer must always be operational during installation of all piles. Pile installation without an operational pressure transducer is not permitted.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- C. The Contractor shall provide automatic monitoring equipment (AME) to the Owner's Special Inspector so that the inspector can record real time depth, grout or concrete pressure, and torque continuously during pile installation. The real time data shall also be available to the equipment operator to assist them in pile installation. The Contractor shall provide the necessary hardware capable of producing a permanent record of the installation of each pile. This record shall include, as a minimum, a graphical record of grout/concrete pressure (measured at the top of the hollow stem), depth of the pile tool, and torque versus time and depth. This record shall be provided to the Owner's Geotechnical Engineer on the following day after each pile is installed.
- D. The Contractor shall provide pressure gauges or other approved devices or means to accurately indicate displacement pressures at the pump. The devices shall be located such that they are clearly visible to the Special Inspector. The Special Inspector may request additional devices, or that the devices be relocated to adequately monitor grout/concrete pressure during the work.
- E. The pile tool and hollow stem auger shall be rigidly fixed to a vertical mast attached to hoisting and transportation equipment capable of maintaining the tool in a fixed position during pile installation. The equipment shall be capable of advancing and withdrawing the pile tool and hollow stem in a slow and continuous manner, and shall be able to deliver sufficient torque and downward force to be able to advance the pile tool to the necessary depth.
- F. The pile tool shall consist of a continuous flight auger of required length and displacing element. All components of the pile tool shall have a diameter at all times equal to the design diameter of the pile. The auger flighting shall be continuous. The auger and the hollow stem shall have a minimum 3-inch-internal-diameter to facilitate grout/concrete injection.
- G. The pile tool shall be attached to a rigid hollow pipe stem capable of transferring the compressive force and torque necessary to advance the tool. The length of the stem shall not be less than 10 feet more than the anticipated depth of the piles. An electronic depth gauge shall be installed in the pile tool to measure the real time depth of the pile tool during pile installation. The hole in the bottom of the auger shall be closed while being advanced into the ground with a suitable plug. The plug shall be removed by grout pressure.
- H. The piling leads or mast shall be clearly marked at all times in at least two locations specified by the Owner's Special Inspector in 1-foot increments, and numbered at 5-foot intervals, such that the Owner's Special Inspector can easily infer the pile tip depth or elevation.

2.5 SUBSTITUTIONS

- A. Material and equipment substitutions shall be made only with the approval of the Owner's Geotechnical and Structural Engineers.

2.6 PILE LOAD TESTS

- A. Hydraulic Jack(s) and Pressure Gauges:
 - 1. Hydraulic jack(s) shall be equipped with the necessary gauges and piping which shall transmit constant load to the pile.
 - 2. Hydraulic jack(s) shall be rated for a load capacity of at least 1.5 times the total test load.
 - 3. Hydraulic jack(s) shall have sufficient ram so that the full test load can be applied at no more than 80% of its extension.
 - 4. Pressure gauge shall be able to read pressures accurately to the nearest 50 psi and shall have a range equivalent to at least twice the pressure required to maintain the full test load.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

5. Hydraulic jack(s) and pressure gauge shall be calibrated as a unit by a certified testing laboratory not more than one month prior to their use at the site. A calibration report indicating jack and pressure gauge identification numbers and a calibration curve shall be submitted to the Owner's Geotechnical Engineer and Special Inspector at least one week prior to beginning any load tests.
- B. Load Cell:
1. The load cell shall have a capacity of at least 1.5 times the maximum test load.
 2. The load cell shall be calibrated by a certified testing laboratory not more than one month prior to its use at the site. A calibration report indicating load cell and read out box serial numbers shall be submitted to the Owner's Geotechnical Engineer and Special Inspector at least one week prior to beginning any load tests.
- C. Dial Indicators:
1. Dial gauges shall be capable of reading to the nearest 0.001 inch and shall have a travel length of at least 3 inches.
 2. All dial gages shall be calibrated prior to use.
- D. Strainmeters and dataloggers:
1. Model 4911 vibrating wire rebar strainmeter as manufactured by Geokon, Ltd or equal with all required dataloggers and software.
 2. Model FP4911 fiber optic rebar strainmeters as manufactured by Geokon, Ltd or equal with all required dataloggers and software.
 3. Model 3911 electrical resistance rebar strainmeters as manufactured by Geokon, Ltd or equal with all required dataloggers and software.

PART 3 - EXECUTION

3.1 LOCATIONS AND TOLERANCES

- A. Piles shall be installed at locations shown on the Contract Drawings prepared by the Owner's Structural Engineer.
- B. Pile centers shall be within 3 inches of those shown on the Contract Drawings at the cut-off elevation, such that no pile in the group is overstressed by more than 10% of the pile design capacity.
- C. Piles shall be installed with deviations no more than 1 inch in 5 feet from the vertical line.
- D. The pile at the cut-off elevation shall be level to plus or minus ½ inch. The piles shall be cut-off to the specified elevation with the specified reinforcement extension above cut-off elevation as shown on the Contract Drawings.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

3.2 MATERIAL DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall deliver or arrange to deliver grout or concrete and reinforcement to the project site in such quantities and at such times to assure continuity of pile installation for the project schedule. The Contractor shall store and handle steel reinforcement and accessories to prevent bending and damage.
- B. Delivered materials shall be subject to the inspection and approval of the Owner and Special Inspector prior to use.
- C. Casing and reinforcing steel shall be clearly labeled with bar/casing size, strength, and lot or batch identification information from the manufacturing plant.

3.3 SITE DRAINAGE CONTROL

- A. The Contractor shall control and manage all site drainage in accordance with the Project's Soil Erosion and Sediment Control Plan.

3.4 PILE INSTALLATION

- A. The Contractor shall give the Owner, Special Inspector, Testing Agency, and the Owner's Engineers at least one week notice before the start of the pile installation work.
- B. Benchmarks and base lines will be established on the site for the use of the Contractor. The Contractor shall establish and locate all other lines and levels and be responsible for the correct locations and deviation measurements of all piles. Contractor shall maintain all location stakes and shall establish all elevations required, including the elevation of the top of the pile.
- C. The Contractor is responsible for preparing and maintaining a clean and clear area around each pile before, during, and after pile installation.
 - 1. Remove all boulders, concrete, masonry, or other obstructions that cannot be removed by conventional augers.
 - 2. Remove all debris, soil, or other foreign matter from the top of the piles to the satisfaction of the Special Inspector.
- D. No piles, other than the test piles and reaction piles shall be installed until the load tests are performed and the test piles meet the acceptance criteria specified herein. Production piles installed before completion of the load tests is at the sole risk of the Contractor. Replacement or additional piles for production piles installed before completion of the load test that do not meet the capacities shown on the Contract Drawings shall be at no cost to Owner.
- E. Installation of test piles and production piles shall not proceed until completion of site preparation and establishment of monitoring base measurements. Sacrificial piles shall be at least six pile diameters clear of production piles unless otherwise approved by the Owner's Engineers.
- F. Contractor's pile installation procedures shall be outlined in their submittal and shall be substantiated during test and reaction pile installation and the load test program. Production pile installation procedure shall be identical to that used to install the test piles.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- G. Before beginning pile installation, the pile tool shall be positioned directly above the pile location and the leads shall be made plumb. The grout/concrete port at the bottom of the pile tool shall be plugged using a pre-approved device, such as cork, to avoid clogging of the pile tool with soil and to avoid mixing of the grout with the groundwater.
- H. The rig shall be equipped with an AME to facilitate automated recording of at least the following:
1. Auger rotation
 2. Depth during augering,
 3. Torque delivered to the auger,
 4. Depth during grouting,
 5. Crowd force (downward thrust on auger),
 6. Grout volume and pressure per increment,
 7. Total grout volume and grout return depth.
- I. The grout injection equipment shall be provided with a grout pressure gage in clear view of the equipment operator and Special Inspector and the grout pump shall be equipped with a stroke counter.
- J. Pile installation shall be initiated by rotating the pile tool and exerting a downward force on the pile tool. Adequate downward force shall be provided so the pile can penetrate whatever subsurface materials are encountered above the pile tip elevation shown in the approved Contractor submittal.
- K. After drilling and before placing grout, obtain final inspection and approval from the Special Inspector. Do not place grout until approved by the Special Inspector.
- L. After the pile tool has reached the designated tip elevation, a slow positive rotation of the tool shall be maintained, and grout/concrete shall be pumped through the hollow stem. Grout/concrete pressure shall be accurately monitored, and withdrawal of the pile tool shall not begin until the pressure has reached a pre-approved lift-off level. Withdrawal of the pile tool shall be steady and continuous and shall be staged such that a positive grout pressure equal to the approved minimum shaft pressure shall be maintained until grout is observed to flow around the tool at the ground surface.
- M. The rate of auger withdrawal and that of grout/concrete injection shall be coordinated such that the amount of grout/concrete pumped per foot of pile during auger retrieval is equal to or greater than the volume per foot of the pile. The grout factor at completion of the grouting, calculated as the ratio of the total volume of grout injected into the pile to the theoretical volume of the pile itself, shall be 1.2 or greater.
1. The grout quantity and rate of auger withdrawal shall be determined using both the AME and manual logging using the predetermined grout volume per pump stroke.
 2. Do not delay placement of grout longer than 15 minutes. Do not create any joints in the piles.
 3. Do not begin placement of grout or concrete until an adequate quantity of grout/concrete is present at the site.
- N. If the pile tool jumps during withdrawal, if the pump skips a stroke, if the grout/concrete pressure during withdrawal of the pile tool is lesser than the desired shaft pressure continuously for 2 feet or more, or if the Special Inspector determined that the rate of grout injection is less than the theoretical volume of the pile per foot, the pile tool shall be lowered a minimum of 5 feet below the depth of the questionable area and re-grouted.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- O. In case there is loss of grout/concrete or the desired pressure cannot be maintained during withdrawal of the pile tool, the shaft shall be temporarily abandoned and shall be re-drilled and re-grouted after about 1 hour. If problems are still encountered, then the shaft shall be filled with grout/concrete and a replacement pile shall be installed at a location determined by the Owner's Structural Engineer.
- P. The pile shaft shall be completely filled with grout/concrete to the ground surface. Grout/concrete shall not be removed from the completed pile shaft by dipping or other means before setting of the grout/concrete. If the plan top of pile is below the working grade, the pile shall be cut-off after the grout/concrete has hardened. If the plan top of pile is above the working grade, a steel casing with an inside diameter equal to the design diameter shall be installed around the pile top immediately after the pile tool has exited the ground and shall be filled with grout/concrete. The grout/concrete at the top of the pile shall be screened and checked for contamination before and after installation of the casing and in general after installation each pile.
- Q. All test piles shall be tested using non-destructive thermal integrity testing. Use down-hole or pre-attached thermal wires to confirm the integrity of the constructed piles from the top to the tip of the pile.
1. The Contractor shall install all necessary wires or tubes during pile installation for integrity testing after installation is complete.
- R. Installed piles shall be periodically checked by the Contractor to determine if the grout/concrete in the piles has settled. If the grout/concrete level drops more than 12 inches or below the plan top of the pile, the top of the pile shall be purged, and fresh grout/concrete shall be added to the top of the pile before the grout/concrete reaches its initial set.
- S. Immediately upon completion of the grouting/concreting of each pile, the specified reinforcement shall be installed. Care shall be taken so not to contaminate the pile grout with soil or other foreign material during reinforcement installation. The reinforcement shall be centered inside the pile shaft using centralizers as specified herein. If difficulty is encountered during installation of the reinforcement, the pile shall be re-drilled and re-grouted. If problems are still encountered, the shaft shall be filled with grout/concrete and a replacement pile shall be installed at a location determined by the Owner's Structural Engineer.
1. Splice reinforcing steel or install mechanical couplers where indicated or where required. Provide tension lap splices of lengths as indicated on the Contract Drawings.
 2. Protect exposed ends of extended reinforcement, dowels, or anchor bolts from mechanical damage and exposure to weather.
- T. Prepare pile top to receive pile cap or grade beam as indicated. Pour tops of piles square with the pile axis and at the elevations indicated. Where the pile top is near the surface or above the bottom of the excavation, sleeves or casing of the proper diameter and at least 18 inches in length shall be placed around the pile tops. Special conditions may require metal sleeves of additional length. Brace sleeves to prevent movement.
- U. Do not initiate installation of a pile within a center-to-center distance from a previously installed pile equal to six times the pile diameter until the grout/concrete for the previously installed pile has been in place for a minimum of 12 hours. Adjacent piles shall not be installed until the grout or concrete in the first pile installed is fully set even if the specified waiting time has been met. The grout or concrete should have set enough such that the integrity of the existing pile will not be compromised if drilling the new pile causes mining of soil away from the existing pile.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- V. If during installation of any pile, any of the piles previously installed show signs of heaving, lateral movement or grout loss; the Contractor shall re-drill and re-grout both piles at no additional cost to the Owner.
- W. Piles shall be considered acceptable if the following criteria are satisfied:
1. Installed per tolerance criteria in Section 3.1 "Locations and Tolerances".
 2. The required tip elevation was reached.
 3. The minimum positive lift-off pressure, substantiated during test pile installation, is achieved before commencing pile tool withdrawal.
 4. The minimum positive shaft pressure, substantiated during the test pile installation, is maintained during pile tool withdrawal.
 5. A minimum grout/concrete ratio equal to or greater than the successfully installed load tested piles is achieved at the end of pile installation.
 6. There are no other conditions observed during pile installation that, in the opinion of the Special Inspector or Owner's Geotechnical Engineer, could be detrimental to the integrity of the pile.
 7. Any piles tested post-installation (integrity testing) shall be reviewed by the Owner's Structural and Geotechnical Engineers for acceptance.
- X. The Contractor shall engage a Professional Land Surveyor, licensed in New Jersey, to provide an as-built survey of all pile locations. The Contractor shall report the as-built survey in a set of drawings that includes column lines, a north arrow, pile identification numbers, the elevation of the top of each pile, and deviation from the plan location. Submit location data of all piles regardless of conformance of tolerance criteria.

3.5 PILE HEAD FINISHING AND PROTECTION

- A. Immediately upon completion of placement of the fluid grout or concrete, the ACIP Pile Contractor shall remove all excess grout or concrete and spoil from the vicinity of the top of the excavation and place a suitable temporary device within the top of the excavation, extending above and below the ground surface by at least 1 foot to keep surface spoil from entering the grout or concrete column before it sets.
- B. Immediately upon placement of the temporary device, the Contractor shall remove any and all loose soil that has fallen into the grout or concrete column using the tools and methods contained in the approved Pile Installation Plan, and before the grout or concrete begins its initial set.
- C. The temporary device shall be removed without disturbing the natural soil surrounding the top of the pile after the grout or concrete is set.

3.6 DAMAGED PILES OR PILES INSTALLED OUTSIDE OF TOLERANCES

- A. Damaged piles and piles outside of the required drilling tolerances shall not be accepted.
- B. Piles rejected after installation shall be withdrawn or abandoned and cut-off a minimum of 12 inches below the pile cap. Additional piles shall be installed to replace the rejected units at the newly designated locations. The replacement pile locations shall be provided by the Owner's Structural Engineer.
- C. Solidly fill spaces that are left by withdrawn piles that will not be filled by new piles, using sand/cement, or other approved grout. Place and compact throughout the length of the space.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

3.7 PILE REVIEW AND CORRECTIVE MEASURES

- A. The installation records for out of tolerance piles shall be submitted to the Owner, Architect, and Engineers within one working day of installation.
- B. The Owner's Structural Engineer shall review the as-built pile surveys to determine the true loading on the piles due to pile group eccentricities, including a review of the pile cap design to determine if pile corrective measures are required. The Contractor shall provide the Owner with final Record Drawings and Installation Records certified by the Contractor's Surveyor or Engineer within 15 calendar days after the completion of piles and before removing the equipment from the site.
- C. Any piles deemed damaged or installed outside the tolerances specified herein shall be replaced at the Contractor's sole expense. If any pile or pile cap redesign is required due to defective or damaged piles or piles installed out of tolerance, the fee for the Owner's Engineers for such redesign work shall be borne by the Contractor. When the structural redesign requires greater quantities of piles or concrete and reinforcing steel, the quantities required shall be compared with the quantities required by the Contract Drawings, and the additional cost for piles, concrete, reinforcing steel and formwork shall be deducted from the contract price, in addition to redesign cost and re-inspection cost.
 - 1. The installation of replacement piles and other corrective measures, including modification of the pile caps, grade beams or other structural elements, shall in all cases be in accordance with design approved by the Owner's Structural Engineer.
 - 2. Additional testing and inspecting, including integrity testing using the low strain method, shall be at the Contractor's expense and will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 LOAD TESTS – GENERAL

- A. The ACIP pile installation equipment, procedures, pile length, and capacity shall be confirmed by load tests, in accordance with the requirements of the New Jersey edition of the International Building Code. Testing shall include the following:
 - 1. Two compression load tests in accordance with ASTM D1143.
 - 2. Two tension load tests in accordance with ASTM D3689.
 - 3. Two lateral load tests in accordance with ASTM D3966.
- B. Additional load tests are required if more than one ACIP pile size and design is proposed by the Contractor.
- C. Loading, testing, and recording of data shall be under the full-time inspection of the Special Inspector. The Contractor shall independently monitor and record all pertinent data.
- D. Test loads shall not be applied to the test piles until the pile grout/concrete has attained sufficient strength as determined by the Owner's Structural and Geotechnical Engineers based on their review of the grout/concrete strength test results.
- E. The hydraulic jack shall be equipped with the necessary gages and piping which shall transmit constant load to the pile. The apparatus for applying the loads shall be as given in the governing ASTM.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- F. The Contractor shall excavate a pit around the pile to allow test load application at a level in proximity to the bottom of the proposed pile cap as directed by the Owner's Geotechnical Engineer, but no lower than the natural groundwater level.
- G. Deflection Measurements
1. Measure pile deflection with at least three dial gauges capable of reading to the nearest 0.001 inch. Dial gauges shall have a travel length of at least 3 inches. Dial gauges shall be mounted on an independent steel test frame to prevent relative movement during the load test.
 2. Linear Variable Differential Transducers (LVDT's) having a range of at least 6 inches, with signed certificates of calibration. Transducers shall be capable of reading to within 0.001 inch of displacement.
 3. Establish a separate mirror, wire, scale set-up, with scale capable of measuring to the nearest 0.02 inch.
 4. Provide independent survey level measurements of the pile using optical level survey equipment capable of reading to the nearest 0.005 foot.
- H. Strain gauges and other instrumentation shall be installed in the test piles as specified herein.
1. The strain gauges installed within test piles shall be vibrating wire strain gauges, such as GEOKON Model VCE 4200, or approved equivalent. Each strain gauge shall be installed onto the center bar reinforcement as recommended by the manufacturer. The strain gauge wires shall be securely attached to the reinforcement to prevent movement and damage during installation.
 2. A minimum of six strain gauges shall be installed within each compression test pile to confirm that the maximum test load is reaching the bearing stratum. Strain gauges shall be installed at elevations directed by the Owner's Geotechnical Engineer. The working condition of the strain gauges shall be verified at the site before inserting into the grouted shaft.
 3. The Contractor shall provide a suitable data acquisition system or read out box and qualified personnel to obtain the data. The Contractor shall be responsible for keeping the data acquisition system in working order at all times. The Contractor shall confirm the initial readings and serial numbers of the strain gauges before insertion into each test pile. The Contractor is responsible for monitoring, reporting, and interpreting strain gauge data throughout the load tests. The Contractor will provide the Special Inspector access to strain gauge monitoring equipment upon request.
- I. The Contractor shall be responsible for any instrumentation damage, and for any necessary corrective measures, including, if necessary, replacement test piles and instrumentation.
- J. All load test results will be reviewed by the Owner's Geotechnical and Structural Engineers for final approval of the pile load capacity.
- K. If the pile load tests determine that the pile did not meet the design capacity criteria set herein, the Contractor shall modify the pile installation procedure or pile design as necessary, including pile diameter, pile reinforcement, and pile length. The modified procedure and/or pile design shall be subjected to review by the Owner's Structural and Geotechnical Engineers. New piles shall be installed following the revised procedure and tested to meet the design capacity criteria set herein. All such supplementary procedures shall be at the Contractor's sole expense.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

3.9 AXIAL COMPRESSION LOAD TESTS

- A. Perform two successful axial compression load tests to at least twice the allowable load shown on the Contract Drawings.
- B. Load Test procedures shall conform to the requirements of ASTM D1143 and the Building Code and the proof load shall be sustained as directed by the Special Inspector but no less than 2 hours after load application.
- C. Compression load tests shall be suitably instrumented with strainmeters or telltales to evaluate the load transfer within the bond zone of the ACIP pile. Where such instruments cannot be provided, the Contractor shall perform a cyclic load test.
- D. Load Schedule: The load shall be applied in increments equal to 10% of the design load in accordance with ASTM D1143 Procedure B: Maintained Test. Intermediate load increments shall be held for a minimum of 30 minutes, but up to 2 hours, per the requirements of ASTM D1143. The final load increment (total test load) shall be sustained for at least 2 hours.
- E. Removal of Loads
 - 1. Removal of load shall be in decrements not exceeding 25% of the total test load.
 - 2. Allow intervals of not less than 10 minutes under each decreasing load.
 - 3. Rebound shall be recorded after each decrement is removed.
 - 4. The final rebound shall be recorded 1 hour after removal of the test load.
- F. Allowable ACIP Pile Compression Capacity: The allowable axial compression ACIP pile capacity shall not exceed the ultimate load capacity divided by a factor of safety of two. The ultimate capacity shall be determined using one of the following methods:
 - 1. Brinch-Hanson 90-percent Criterion
 - 2. Butler-Hoy Criterion

3.10 AXIAL TENSION LOAD TESTS

- A. Perform two successful axial tension load tests to at least twice the allowable load shown on the Contract Drawings.
- B. The tension test pile shall be reinforced with the required reinforcing steel plus any additional reinforcing necessary to facilitate the load test.
- C. Load Test procedures shall conform to the requirements of ASTM D3689.
- D. Load Schedule: The load shall be applied in increments equal to 10% of the design load using the maintained test schedule in ASTM D3689. Intermediate load increments shall be held as for a minimum of 30 minutes, but up to 2 hours, per the requirements of ASTM D3689 Method B: Maintained Test.
- E. Removal of Loads
 - 1. Removal of load shall be in decrements not exceeding 25% of the total test load.
 - 2. Allow intervals of not less than 10 minutes under each decreasing load.
 - 3. Rebound shall be recorded after each decrement is removed.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

4. The final rebound shall be recorded 1 hour after removal of the test load.

F. Allowable ACIP Pile Tension Capacity - The allowable axial tension pile capacity shall not exceed the ultimate load capacity divided by a factor of safety of two.

3.11 LATERAL LOAD TESTS

A. Perform two successful lateral load tests to at least twice the allowable load shown on the Contract Drawings.

B. Load Test procedures shall conform to the requirements of ASTM D3966.

C. Load Schedule: The load shall be applied in accordance with the cyclic loading procedure in ASTM D3966.

D. Allowable ACIP Pile Lateral Capacity: The allowable lateral pile capacity shall be:

1. The allowable load shall not be more than one-half of that test load that produces a gross lateral movement of 1 inch at the ground surface in the lateral load test.

3.12 PILE INTEGRITY TESTS

A. All test piles shall be tested using non-destructive thermal integrity testing. Use down-hole or pre-attached thermal wires to confirm the integrity of the constructed piles from the top to the tip of the pile.

B. All test piles and at least 10% of all production piles shall be tested for integrity using impulse response testing in accordance with ASTM D5882.

C. The first 10 piles installed by the Contractor shall be integrity tested. Thereafter, the frequency of such tests can set to intervals agreed upon with the Owner's Engineer to meet the 20% criteria.

D. The Contractor shall engage an independent Consultant, acceptable to the Owner and Engineer, to perform integrity tests and to report the results, with interpretations, to the Contractor and the Owner's Engineers. All impulse response integrity testing should be accomplished by a contractor with experience with impulse response integrity testing techniques.

3.13 POST-INSTALLATION

A. Installed piles shall be periodically checked by the Contractor to determine if the grout in the piles has settled. If the grout level drops more than about 12 inches or below the pile cut-off elevation, the top of the pile shall be purged and fresh grout shall be added to the top of the pile prior to the grout reaching its initial set to maintain the proper elevation. At no time shall the Contractor allow the grout to settle below the cut-off elevation.

B. Accepted piles shall not be cut-off until at least seven days after installation, unless otherwise approved by the Owner's Engineers.

COOPER UNIVERSITY HEALTH CARE
COOPER UNIVERSITY HOSPITAL – TOWER A
CAMDEN, NEW JERSEY

- C. Any damage to the pile during excavation or pile cutting or revealed during integrity testing shall be the responsibility of the Contractor unless otherwise indicated by the Owner. If the Structural Engineer determined that a damaged pile can be repaired, the Contractor shall do so at their own expense and in accordance with the Owner's Engineer's recommendations. If replacement piles are required as determined by the Owner's Engineers, the Contractors shall install the replacement piles at no additional cost to the Owner.
- D. The Contractor shall remove all materials excavated by augering, any excess grout/concrete, and pile cut-off remnants from within the foundation area and dispose of the materials off site.
- E. The Contractor shall not demobilize their equipment from the project site until all piles necessary for the testing phase are installed and accepted by the Owner's Geotechnical and Structural Engineers or until directed to do so by the Owner. During the production phase, the Contractor shall not demobilize their equipment from the project site until all piles are installed and accepted.

3.14 CLEAN-UP

- A. All excess material including earth, rock, fill, and construction debris shall be removed from site and legally disposed of.
- B. All lumber, forms and metal work shall be removed immediately after completion of local areas. The Contractor shall be responsible for removal of all debris produced by work to this section from the site.
- C. Sidewalk and streets adjoining the property shall be broom cleaned and free of debris, rubbish, trash and obstructions of any kind caused by the work of this Section.

3.15 CLOSEOUT

- A. Substantial Completion Requirements:
 - 1. Provide final cleaning immediately prior to Substantial Completion inspection.
 - 2. Corrective Work:
 - a. Remove, repair and reinstall, or restore in place damaged items.
 - b. Replace damaged materials or items with new if repair not acceptable to Architect.
 - 3. Provide product data to complete Operation & Maintenance Manuals.
- B. Submit executed Warranties.

3.16 WASTE MANAGEMENT

- A. Separate and dispose of waste in accordance with the Project's Waste Management Plan.
- B. The Contractor shall control and properly dispose of construction related waste, including excess grout and concrete, in accordance with all applicable local, State and Federal codes and regulations.

END OF SECTION