

ADDENDUM NO.: 2.0

DATE OF ADDENDUM: October 23, 2014

Founders Hall Renovations for Allied Health and Nursing  
Naugatuck Valley Community College, Waterbury, Connecticut  
BI – CTC – 442 – CMR

Original Bid Due Date / Time:

Date: November 13, 2014

Time: 2:00 PM EST

Previous Addenda: 1.0

**TO: Prospective Bid Proposers:**

This Addendum forms part of the "Contract Documents" and modifies or clarifies the original "Contract Documents" for this Project dated August 14, 2014. Prospective Bid Proposers shall acknowledge receipt of the total number of the Addenda issued for this Project on the space provided on Section 00 41 00 Bid Proposal Form. Failure to do may subject Bid Proposers to disqualification.

The following clarifications are applicable to drawings and specifications for the project referenced above.

**Item 1.**

The bid opening date is unchanged.

**SPECIFICATIONS AND DRAWINGS**

**Item 2.**

**ADD** the removal of asbestos containing foundation damp proofing from existing building foundations to the Work of this Project. Removal of asbestos containing foundation damp proofing is expected to occur during the time when the foundations are exposed for application of new waterproofing, installation of new insulation and replacement of footing drain, and shall be accomplished according to specification Section 028213 – ASBESTOS ABATEMENT consisting of 19 pages and dated 10/22/14 and as shown by Sketch ASB-1A EXTERIOR ASBESTOS FOUNDATION dated 10/22/14, both attached to and issued with this Addendum. Refer to "Bulk Asbestos Analysis Report" Lab Log No. 0044709 dated October 13, 2014 for Project No. 224720.0003.0000 consisting of 2 pages attached for information only to this Addendum.

**Item 3.**

SECTION 316213 – DRILLED PIERS: **ADD** to the Specifications Section 316213 "DRILLED PIERS" consisting of 5 pages, attached to and issued with this Addendum.

**Item 4.**

GENERAL: Bidders are reminded that the cut-off date for requests for information to be addressed in Addenda is [November 3, 2014]. NO QUESTIONS WILL BE ANSWERED AFTER THAT DATE.

**Item 5.**

00 41 02.02 Bid Package #2 Abatement and Demolition: This bid package contractor should be aware that addendum #1 and addendum #2 significantly reduced your scope of work. Please review these addendums in detail to review and incorporate these scope revisions into your bid.

All questions must be in writing by e-mail or fax (not phone) and must be forwarded to the Construction Manager (Edward Barrett, ebarrett@morganti.com, fax 203-790-6138) The Construction Manager, The Morganti Group, Inc. will review your questions in conjunction with the Owner and Architect and reply by addendum only.

**End of Addendum Two**

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**PART 1 GENERAL**

**1.1 SCOPE**

- A. Work under this item shall include the abatement of asbestos containing materials (ACM) and associated work by persons who are knowledgeable, qualified, trained and licensed in the removal, treatment, handling, and disposal of ACM and the subsequent cleaning of the affected environment. ACM shall include material composed of any type of asbestos in amounts greater than one percent (1%) by weight. The Contractor performing this work shall possess a valid Asbestos Abatement Contractor license issued by the Connecticut Department of Public Health (CTDPH). Where areas to be abated contain materials with PCBs and asbestos the workers shall follow this Specification as well as Specification 02 84 33.
- B. These Specifications govern all work activities that disturb asbestos containing materials. All activities shall be performed in accordance with, but not limited to, the current revision of the OSHA General Industry Standard for Asbestos (29 CFR 1926.1001), the OSHA Asbestos in Construction Regulations (29 CFR 1926.1101), the USEPA Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP) Regulations (40 CFR Part 61 Subpart M), the CTDPH Standards for Asbestos Abatement, Licensure and Training (19a-332a-1 through 16, 20-440-1 through 9 & 20-441), and the CTDEEP Special Waste Disposal Regulations (22a-209-8(i)).
- C. The asbestos abatement work shall include the removal and disposal of all ACM as identified on the Contract Plans and Specifications prior to the planned renovation/demolition project. The Connecticut Department of Construction Services will retain the services of a State of Connecticut licensed Project Monitor for protection of its interests and those using the building.
- D. Deviations from these Specifications require the written approval of the Engineer and Owner.
- E. The Contractor may elect to utilize an Alternative Work Practice (AWP), if approved by the CTDPH and the Engineer/Owner prior to the initiation of the abatement activities. An AWP is a variance from certain CTDPH asbestos regulatory requirements, which must provide the equivalent or a greater measure of asbestos emission control than the standard work practices prescribed by the CTDPH.

**1.2 DESCRIPTION OF WORK**

- A. The following details the extent of each phase of operation designated for this project. Phase areas may be combined or divided at the direction of the Engineer/Construction Manager. Proceed through the sequencing of the work phases under the direction of the Engineer/Construction Manager.
- B. The asbestos abatement work shall include the removal of asbestos-containing materials as specified herein. This abatement project was designed by Mr. Donald LePage, a State of Connecticut licensed Asbestos Project Designer (#000233).

**Exterior**

Includes the removal of:

- Exterior black foundation tar sealant on the 3-story section of the building (as depicted in drawing).

**Option 1:** A regulated area(s) shall be established at the perimeter of the work area(s), and access shall be controlled by the Contractor. A remote personnel decontamination unit shall be utilized. Removal shall be undertaken in accordance with OSHA Class II and USEPA Asbestos NESHAP requirements. Visual inspection shall be performed by project monitor prior to work area being deregulated. Contractor shall utilize manual and/or HEPA-cowled tools which create no visible emissions. No containment required for exterior abatement as long as there are no visible emissions.

**Option 2:** If the Contractor utilizes any methods which create visible emissions, asbestos removal shall be performed with a negative pressure enclosure (NPE) and a contiguous decontamination system in accordance with OSHA Class II and USEPA NESHAP requirements. NPE will be built with reinforced poly and plywood at the discretion of the Engineer. Visual inspection shall be performed by project monitor prior to work area being deregulated.

**Notes:** All excavation work required to access the black tar foundation sealant will be performed by the Morganti Group.

1.3 SUBMITTALS AND NOTICES

- A. The Contractor shall submit, in accordance with CTDPH Standard 19a-332a-3, proper notification using the prescribed form, to the Commissioner, State of Connecticut, Department of Public Health not fewer than ten (10) days prior to the commencement of work as follows:
1. Asbestos abatement projects involving greater than ten (10) linear feet (LF) or twenty-five (25) square feet (SF) of ACM (friable or non-friable) within a facility (i.e. interior abatement) and/or greater than 10 LF or 25 SF of friable ACM outside a facility, require an Asbestos Abatement Notification.
  2. At sites scheduled for demolition, asbestos abatement of exterior non-friable ACM or interior abatement involving less than 10 LF or 25 SF of ACM (friable or non-friable), and/or exterior abatement involving less than 10 LF or 25 SF of friable ACM require a Demolition Notification. In most cases, the Demolition Contractor is responsible for filing the Demolition Notification not fewer than ten (10) days prior to the commencement of demolition. However, if a portion of the demolition activities are scheduled to be conducted in conjunction with and/or under the supervision of an Asbestos Abatement Contractor (i.e. in the event of a structure which has been condemned, structurally damaged, and/or deemed

unsafe for asbestos abatement activities); then it is the responsibility of the Asbestos Abatement Contractor to submit the Demolition Notification.

3. In the event that an Asbestos Abatement Notification has been submitted and the subject facility is scheduled for demolition, a separate Demolition Notification form does not need to be submitted. In such cases, the submission of the Asbestos Abatement Notification form shall be deemed as satisfying the requirement for the notification of the demolition of the facility.
  4. The Contractor filing the proper notification is responsible for all associated fees.
  5. If the Contractor intends to dispose of ACM waste within the State of Connecticut, a copy of the Asbestos Abatement/Demolition Notification must also be submitted to the Department of Environmental Protection, Solid Waste Management Unit, and the Contractor must obtain a CTDEEP Special Waste Disposal authorization.
- B. Any Alternative Work Practice (AWP) specifically described in these Specifications is pre-approved and is to be utilized at all times. Additional AWP methods may be used if approved by CTDPH and the Engineer/Owner. Should the Contractor desire to use AWP procedures that have not been pre-approved, the Contractor shall submit in writing a description of the proposed methods to the Engineer/Owner and CTDPH for review and approval. Alternative procedures shall provide equivalent or greater protection than procedures which they replace. The Contractor is responsible for all fees associated with filing AWP applications which have not been pre-approved. Submission of AWP applications requires a CTDPH Project Designer License. The Contractor shall not proceed with any AWP other than those listed in this Specification without approval from both the CTDPH and the Engineer/Owner.
- C. Fifteen (15) working days prior to the commencement of asbestos abatement work (Pre-abatement Meeting), the Contractor shall submit to the Engineer/Owner for review and acceptance and/or acknowledgment of the following:
1. Copies of all required notifications.
  2. AWP applications/approvals.
  3. Permits and licenses for the removal, transport, and disposal of asbestos-containing or contaminated materials, including a CTDPH valid asbestos removal contractor's license.
  4. Documentation dated within the previous twelve (12) months, certifying that all employees have received USEPA Model Accreditation Plan approved asbestos worker/supervisor training in the proper handling of materials that contain asbestos; understand the health implications and risks involved, including the illnesses possible from exposure to airborne asbestos fibers; understands the use and limits of respiratory equipment to be used; and understands the results of monitoring of airborne quantities of asbestos as related to health and respiratory

equipment as indicated in 29 CFR 1926.1101 on an initial and annual basis, and copies of all employees CTDPH asbestos worker and/or supervisor licenses.

5. Documentation from the Contractor, typed on company letterhead and signed by the Contractor, certifying that all employees listed herein have received the following:
    - a. Medical monitoring within the previous twelve (12) months, as required in 29 CFR 1926.1101
    - b. Respirator fit testing within the previous twelve (12) months, as detailed in 29 CFR 1910.134 (for all employees who must also don a tight-fitting face piece respirator)
  6. Copies of the EPA/State-approved certificates for the proposed asbestos landfill.
  7. Name and qualifications of the Asbestos Abatement Site Supervisor. This individual shall be the OSHA Competent Person for the abatement activities, shall have a minimum of three years working experience as an Asbestos Abatement Site Supervisor, shall be capable of identifying existing asbestos hazards and shall have the authority to implement corrective measures to eliminate such hazards. The Asbestos Abatement Site Supervisor shall be on-site at all times asbestos abatement is occurring, shall comply with applicable Federal, State and Local regulations which mandate work practices, and shall be capable of performing the work of this contract.
- D. No abatement shall commence until a copy of all required submittals have been received and found acceptable to the Engineer. Those employees added to the Contractor's original list will be allowed to perform work only upon submittal to, and receipt of, all required paperwork by the Engineer.
- E. Provide the Engineer/Owner, within 30 days of completion of asbestos abatement, a compliance package; which shall include, but not be limited to, the following:
1. Asbestos Abatement Site Supervisor job log;
  2. OSHA personnel air sampling data and exposure assessments;
  3. Completed waste shipment records.

#### 1.4 SEQUENCE OF WORK

- A. The Contractor shall proceed in accordance with the sequence of work as directed by the Engineer/Construction Manager. Work shall be divided into convenient Work Areas, each of which is to be completed as a separate unit.
- B. The Contractor shall use the following sequence for the asbestos abatement work:
  1. Release of work area to Contractor.

2. A visual inspection of the work area to determine pre-existing damage to facility components.
3. Removal of all moveable objects from the Work Areas undergoing abatement by the Contractor.
4. All temporary utilities required for the project shall be on site and operational prior to the initiation of asbestos work.
5. Abatement of all asbestos-containing materials by the Contractor.
6. Final visual inspections by the Project Monitor.
7. Air sampling by the Project Monitor for re-occupancy.
8. Cleanup by the Contractor. Work Areas must be returned to their original condition of better.
9. Removal of waste from the site.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. All materials shall be delivered to the job site in the original packages, containers, or bundles bearing the name of the manufacturer, the brand name and product technical description.
- B. No damaged or deteriorating materials shall be used. If material becomes contaminated with asbestos, the material shall be decontaminated or disposed of as asbestos-containing waste material. The cost to decontaminate and dispose of this material shall be at the expense of the Contractor.
- C. Fire retardant polyethylene sheet shall be in roll size to minimize the frequency of joints, with factory label indicating four (4) or six (6) mil thickness.
- D. Six (6) mil polyethylene disposable bags shall have pre-printed OSHA/EPA/DOT labels and shall be transparent.
- E. Tape (or equivalent) capable of sealing joints in adjacent polyethylene sheets and for the attachment of polyethylene sheets to finished or unfinished surfaces must be capable of adhering under both dry and wet conditions.
- F. Surfactant is a chemical wetting agent added to water to improve penetration and shall consist of fifty (50) percent polyoxyethylene ether and fifty (50) percent polyoxyethylene ester, or equivalent. The surfactant shall be mixed with water to provide a concentration one (1) ounce surfactant to five (5) gallons of water, or as directed by the manufacturer.

- G. Spray equipment must be capable of mixing necessary chemical agents with water, generating sufficient pressure and volume; and equipped with adequate hose length to access all necessary work areas.
- H. Mechanical mastic removal equipment shall be suitable for the application and shall be operated in a manner which prevents damage to the underlying floor. Sanders, grinders, wire brushes and needle-gun type removal equipment shall be equipped with a High Efficiency Particulate Air (HEPA) filtered vacuum dust collection system.
- I. Containers for storage, transportation and disposal of asbestos containing waste material shall be impermeable and both air and watertight.
- J. Labels and warning signs shall conform to OSHA 29 CFR 1926.1101, USEPA 40 CFR Part 61.152, and USDOT 49 CFR Part 172 as appropriate.
- K. Encapsulant, a material used to chemically entrap asbestos fibers to prevent these fibers from becoming airborne, shall be of the type which has been approved by the Engineer. Use shall be in accordance with manufacturer's printed technical data. The encapsulant shall be clear and must be compatible with new materials being installed, if any.
- L. Glovebag assembly shall be manufactured of six (6) mil transparent polyethylene or PVC with two (2) inward projecting long sleeve gloves, an internal pouch for tools, and an attached labeled receptacle for waste.
- M. Mastic removal chemicals shall be low odor and non-citrus based, with a flash point in excess of 140° F.
- N. Any planking, bracing, shoring, barricades and/or temporary sheet piling, necessary to appropriately perform work activities shall conform to all applicable federal, state and local regulations.
- O. Air filtration devices and vacuum units shall be equipped with HEPA filters.

## 2.2 TOOLS AND EQUIPMENT

- A. Air monitoring equipment of the type and quantity required to monitor operations and conduct personnel exposure surveillance shall conform to OSHA requirements.
- B. Protective clothing, respirators, filter cartridges, air filters and sample filter cassettes shall be provided in sufficient quantities for the project.
- C. Electrical equipment, protective devices and power cables shall conform to all applicable codes.
- D. Shower stalls and plumbing shall include sufficient hose length and drain system or an acceptable alternate. Showers shall be equipped with hot and cold or warm running water. One shower stall shall be provided for each eight workers. Water is filtered

through a 5 micron and a 10 micron filter prior to being discharged into the city sewer/sanitary system.

- E. The Contractor may need to supply electrical power to the site by either fuel operated generator(s) or temporary restoration of electrical service. Electrical power supply will be sufficient for maintaining in operation all equipment required for this project throughout the duration of the project.
- F. Exhaust air filtration units shall be equipped with HEPA filters capable of providing sufficient air exhaust to create a minimum pressure differential of 0.02 inches of water column, and to allow a sufficient flow of air through the area providing 4 air changes per hour. An automatic warning system shall be incorporated into the equipment to indicate pressure drop or unit failure. No air movement system or air filtering equipment shall discharge unfiltered air outside the Regulated Area. The Contractor shall provide actual airflow measurement of filtration units while the unit is in place and calculate actual air exchange rates.
- G. Pressure differential monitoring equipment shall be provided to ensure exhaust air filtration devices provide the minimum pressure differential required between the Work Area and occupied areas of the facility.
- H. Vacuum units, of suitable size and capabilities for the project, shall have HEPA filters capable of trapping and retaining at least 99.97 percent of all monodispersed particles of three micrometers in diameter or larger.
- I. Ladders and/or scaffolds shall be of adequate length, strength and sufficient quantity to support the work schedule.
- J. Other materials such as lumber, nails and hardware necessary to construct and dismantle the decontamination enclosures and the barriers that isolate the Work Area shall be provided as appropriate for the work.
- K. Spray equipment shall be capable of mixing wetting agent with water and capable of generating sufficient pressure and volume. Hose length shall be sufficient to reach all of the Regulated area.
- L. Mechanical mastic removal equipment shall be suitable for the application and shall be operated in a manner which prevents excessive damage to the underlying floor.

### **PART 3 EXECUTION**

#### **3.1 GENERAL REQUIREMENTS**

- A. The Abatement Contractor/Subcontractor shall possess a valid State of Connecticut Asbestos Contractor License. Should any portion of the work be subcontracted, the subcontractor must also possess a valid State of Connecticut Asbestos Contractor License. The Asbestos Abatement Site Supervisor employed by the Contractor shall be in control on the job site at all times during asbestos abatement work. All employees of the

Contractor who shall perform work (i.e. Asbestos Abatement Site Supervisor, Asbestos Abatement Worker) shall be properly certified/licensed by the State of Connecticut to perform such duties.

- B. All labor, materials, tools, equipment, services, testing, insurance (with specific coverage for work on asbestos), and incidentals which are necessary or required to perform the work in accordance with applicable governmental regulations, industry standards and codes, and these Specifications shall be provided by the Contractor. The Contractor shall be prepared to work all shifts and weekends throughout the course of this project.
- C. Prior to beginning work, the Engineer and Contractor shall perform a visual survey of each work area and review conditions at the site for safety reasons. In addition, the Contractor shall instruct all workers in all aspects of personnel protection, work procedures, emergency evacuation procedures and use of equipment including procedures unique to this project.
- D. The Contractor shall:
  - 1. Shutdown and isolate heating, cooling, and ventilating air systems to prevent contamination and fiber dispersal to the other areas of the building.
  - 2. Shut down and lock out electrical power, including all receptacles and light fixtures, when feasible. The use or isolation of electrical power will be coordinated with all other ongoing uses of electrical power at the site.
  - 3. Coordinate all power and fire alarm isolation with the appropriate representatives.
  - 4. When necessary, provide temporary power and adequate lighting and ensure safe installation of electrical equipment, including ground fault protection and power cables, in compliance with applicable electrical codes and OSHA requirements. The Contractor is responsible for proper connection and installation of electrical wiring.
- E. If sufficient electrical service is unavailable, the Contractor may need to supply electrical power to the site by fuel operated generator(s). Electrical power supply shall be sufficient for all equipment required for this project in operation throughout the duration of the project. If the Contractor elects to supply electrical power to the work site through the use of generators, the Contractor shall ensure that each work area is a manageable size such that removal, final cleaning and reoccupancy testing can be accomplished within one work shift while negative air machines are operating.
- F. Negative pressure must be continuously maintained in each work area, until the area achieves satisfactory reoccupancy criteria and is approved by the Project Monitor to be deregulated. Negative air pressure must be maintained twenty-four (24) hours per day and the Contractor shall establish temporary electrical service to the site, rather than utilize generators.

- G. Water service may not be available at the site. Contractor shall supply sufficient water for each shift to operate the decontamination shower units as well as to maintain the work areas adequately wet.
- H. Ladders and/or scaffolds shall be in compliance with OSHA requirements, and of adequate length, strength and sufficient quantity to support the scope of work. Use of ladders/scaffolds shall be in conformance with OSHA 29 CFR 1926 Subpart L and X requirements.
- I. Work performed at heights exceeding six feet (6') shall be performed in accordance with the OSHA Fall Protection Standard 29 CFR 1926 Subpart M including the use of fall arrest systems as applicable.
- J. Data provided regarding asbestos sampling conducted throughout the structure(s) is for informational purposes only. Under no circumstances shall this information be the sole means used by the Contractor for determining the presence and location of all asbestos containing materials. The Contractor shall verify all field conditions affecting performance of the work as described in these Specifications in accordance with OSHA, USEPA, USDOT, DEP standards. Compliance with the applicable requirements is solely the responsibility of the Contractor.
- K. The Engineer will provide a Project Monitor to oversee the activities of the Contractor. No asbestos work shall be performed until the Project Monitor is on-site. Pre-abatement, during abatement and post-abatement air sampling will be conducted as deemed necessary by the Project Monitor. Waste stream testing will be performed, as necessary, by the Project Monitor prior to waste disposal.

### 3.2 PREPARATION OF WORK AREA ENCLOSURE SYSTEM

- A. Pre-clean the work areas using HEPA filtered equipment (vacuum) and/or wet methods as appropriate, collecting and properly containing all dust and debris as asbestos-containing/asbestos contaminated waste. Vacuum units, of suitable size and capabilities for the project, shall have HEPA filters capable of trapping and retaining at least 99.97 percent of all monodispersed particles of three micrometers in diameter or larger. Do not use methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters.
- B. After pre-cleaning, movable objects shall be removed from the work areas with the utmost care to prevent damage of any kind and relocated to a temporary storage location coordinated with the Engineer. The Contractor is responsible for protecting all fixed objects that are permanent fixtures or are too large to remove and remain inside the Regulated Area. Fixed objects shall be enclosed with one layer of six (6) mil polyethylene sheeting sealed with tape.
- C. Where non-ACM insulation exists within a Regulated Area, the Contractor has the option of removing the non-ACM insulation material and disposing of as ACM debris, or decontaminating and protecting non-ACM insulation material with two (2) layers of six

(6) mil polyethylene sheeting. Any non-ACM insulation removed shall be replaced with new material of equal or better quality at the Contractor's expense.

### 3.3 WORKER DECONTAMINATION ENCLOSURE SYSTEM

- A. The Contractor shall establish contiguous to the Regulated Area, a Worker Decontamination Enclosure System consisting of Equipment Room, Shower Room and Clean Room in series, as detailed below. Access to the Regulated Area shall only be through this enclosure.
- B. Access between rooms in the Worker Decontamination Enclosure System shall be through airlocks. Other effective designs are permissible. The Clean Room, Shower Room and Equipment Room located within the Worker Decontamination Enclosure, shall be contiguously connected with taped airtight edges, thus ensuring the sole source of airflow originates from outside the regulated areas, once the negative pressure differential within the Regulated Area is established.
- C. The Clean Room shall be adequately sized to accommodate workers and shall be equipped with a suitable number of hooks, lockers, shelves, etc., for workers to store personal articles and clothing. Changing areas of the Clean Room shall be suitably screened from areas occupied by the public.
- D. The Shower Room shall be of sufficient capacity to accommodate the number of workers. One shower stall shall be provided for each eight (8) workers. Showers shall be equipped with hot and cold or warm running water through the use of electric hot water heaters supplied by the Contractor. No worker or other person shall leave a Regulated Area without showering. Shower water shall be collected and filtered using best available technology and dumped down an approved sanitary drain. Shower stalls and plumbing shall include sufficient hose length and drain system or an acceptable alternate.

### 3.4 EQUIPMENT DECONTAMINATION ENCLOSURE SYSTEM

- A. The Contractor shall establish contiguous to the Regulated Area an Equipment/Waste Removal Decontamination Enclosure System consisting of two (2) totally enclosed chambers divided by a double flap curtained opening. Other effective designs are permissible. This enclosure must be constructed so as to ensure that no personnel enter or exit through this unit.
- B. The Contractor shall ensure that no personnel or equipment be permitted to leave the Regulated Area until proper decontamination procedures (including HEPA vacuuming, wet wiping and showering) to remove all asbestos debris have occurred. No asbestos-contaminated materials or persons shall enter the Clean Room.

### 3.5 SEPARATION OF WORK AREAS FROM OCCUPIED AREAS

- A. Seal off all windows, doorways, skylights, ducts, grilles, diffusers, vents, light fixtures, electrical receptacles, suspended ceiling tile systems and any other openings between the Regulated Area and the uncontaminated areas outside of the Regulated Area, including

the outside of the building, with critical barriers consisting of a minimum of one (1) layer of six (6) mil polyethylene sheeting securing the edges with tape. Doorways and corridors which will not be used for passage during work and separate the regulated areas from occupied areas must be sealed with fixed critical barriers constructed of 2" x 4" wood or metal framing 16" O.C., with ½" plywood on the occupied side and two layers of six (6) mil polyethylene sheeting on the Regulated Area side to prevent unauthorized access or air flow.

- B. The Contractor shall create a negative pressure differential in the range of 0.02 to 0.04 inches of water column between the Regulated Area and surrounding areas by the use of acceptable negative air pressure equipment. Exhaust air filtration units shall be equipped with HEPA filters capable of providing sufficient air exhaust to create a minimum pressure differential of 0.02 inches of water column, and to allow a sufficient flow of air through the area providing 4 air changes per hour. The Contractor shall provide a sufficient quantity of HEPA air filters to maintain the pressure differential throughout the duration of the project. An automatic warning system shall be incorporated into the equipment to indicate pressure drop or unit failure. Continuously monitor the pressure differential between the Regulated Area and surrounding area to ensure exhaust air filtration equipment maintains a minimum pressure differential of 0.02 inches of water column. The Contractor shall provide actual air flow measurement of filtration units while the unit is in place and calculate actual air exchange rates. No air movement system or air filtering equipment shall discharge unfiltered air outside the Regulated Area.
- C. A Negative Pressure Enclosure (NPE) shall be constructed via covering of floor and wall surfaces with polyethylene sheeting sealed with tape. Polyethylene shall be applied alternately to floors and walls. Cover floors first, with a layer of six (6) mil polyethylene sheeting, so that polyethylene extends at least twelve (12) inches up on wall. Cover wall with a layer of four (4) mil polyethylene sheeting to twelve (12) inches beyond the wall/floor intersection, thus overlapping the floor material by a minimum of twenty-four (24) inches. Repeat the process for the second layer of polyethylene. There shall be no seams at wall-to-floor joints. Protect carpet and floor tile with two additional layers of six (6) mil reinforced polyethylene in addition to the prior two layers required.
- D. Conspicuously label and maintain emergency and fire exits from the Regulated Area satisfactory to fire officials.
- E. Post warning signs meeting the specifications of OSHA 29 CFR 1910.1001 and 29 CFR 1926.1101 at each Regulated Area. In addition, signs shall be posted at all approaches to Regulated Areas so that an employee or building occupant may read the sign and take the necessary protective steps before entering the area. Additional signs may require posting following construction of workplace enclosure barriers.

### 3.6 ALTERNATE EXTERIOR NON-FRIABLE ASBESTOS SET-UP PROCEDURES

- A. In lieu of the establishment of a negative pressure enclosure (NPE) system as described by CTDPH Sections 19a-332a-5(c), 5(d), 5(e), and 5(h), non-friable ACM will be removed from exterior work areas within an outdoor Regulated Area(s). The regulated

work area will be established by the use of appropriately labeled barrier tape and postings in compliance with CTDPH 19a-332a-5(a) as well as OSHA 29 CFR 1926.1101. A remote personnel decontamination unit as specified in Section 19a-332a-6 will be required. This method shall only be utilized provided exposure assessment air sampling data collected during the removal of the exterior non-friable materials indicates that the exposure levels during removal of such materials do not exceed 0.1 asbestos f/cc. Should exposure assessment air sampling data exceed this level, and engineering efforts to reduce the airborne fiber levels not be successful in reducing the levels to less than 0.1 f/cc, removal shall occur within these areas under full containment conditions.

### 3.7 ALTERNATE "SPOT REPAIR" ASBESTOS PROCEDURES

- A. In lieu of the establishment of a negative pressure enclosure (NPE) system as described by CTDPH Sections 19a-332a-5(c), 5(d), 5(e), and 5(h), less than 3 LF or 3 SF of ACM will be removed as a "spot repair" in accordance with CTDPH Section 19a-332a-10. A regulated area will be established by the use of appropriately labeled barrier tape and postings in compliance with CTDPH 19a-332a-5(a) as well as OSHA 29 CFR 1926.1101. A remote personnel decontamination unit as specified in Section 19a-332a-6 will be required. Air-tight barriers will be constructed to assure that asbestos fibers released during abatement activities are contained within the work area. (Glovebags are permitted, as specified below.) ACM will be adequately wet prior to disturbance and remain wet until placed in leak-tight container. Following abatement, clean-up methods within the work area will include HEPA-filtered vacuuming or wet cleaning techniques until no visible residue remains.
- B. Glovebags utilized to perform "spot repair" activities on asbestos containing pipe insulation/mudded fitting insulation, in conformance with OSHA 29 CFR 1926.1101(g)(5)(ii), shall be:
1. constructed of 6 mil poly, seamless at bottom, unmodified
  2. installed so that it completely covers the circumference of pipe or other structure where work is to be done, with impermeable dropcloths placed on all surfaces beneath the work area
  3. smoke-tested for leaks and sealed, as needed
  4. used only once, may not be moved
  5. used only on surfaces with temperatures <150°F
  6. collapsed by removing air via HEPA-vacuum, prior to disposal
  7. adhered to surfaces which are intact, surfaces with loose and friable material shall be sealed in two layers of 6 mil poly or otherwise rendered intact
  8. capable of sustaining integrity at connection site to attached waste bag, which must have equivalent of sliding valve for disconnection (as applicable)
  9. performed by a minimum of two (2) persons
- C. Glovebags may also be used for "spot repair" abatement procedures involving additional materials (e.g. floor tile/linoleum, transite, etc.) provided that the glovebag is capable of fully enclosing the material to be removed.

### 3.8 PERSONNEL PROTECTION

- A. The Contractor shall utilize all appropriate engineering controls and safety and protective equipment while performing the work in accordance with OSHA, USEPA, USDOT, CTDEEP and CTDPH regulations.
- B. The Contractor shall provide and require all workers to wear protective clothing in the Regulated Areas where asbestos fiber concentrations may reasonably be expected to exceed the OSHA established Permissible Exposure Limits (PEL) or where asbestos contamination exists. Protective clothing shall include impervious coveralls with elastic wrists and ankles, head covering, gloves and foot coverings.
- C. Respiratory protection shall be provided and selection shall conform to the requirements of OSHA 29 CFR 1910.134 and 29 CFR 1926.1101 as well as the requirements of the CTDPH regulations and 42 CFR Part 84. A formal respiratory protection program must be implemented in accordance with 29 CFR 1926.1101 and 29 CFR 1910.134.
- D. All other necessary personnel protective equipment (i.e. hardhat, work boots, safety glasses, hearing protection, etc.) required to perform the asbestos abatement work activities shall conform to all applicable federal, state and local regulations.
- E. All other qualified and authorized persons entering into a Regulated Area (i.e. Project Monitor, Regulatory Agency Representative) shall adhere to the requirements of personnel protection as stated in this section.

### 3.9 ASBESTOS ABATEMENT PROCEDURES

- A. The Asbestos Abatement Site Supervisor, as the OSHA Competent Person shall be at the site at all times.
- B. The Contractor shall not begin abatement work until authorized by the Project Monitor, following a pre-abatement visual inspection.
- C. All workers and authorized persons shall enter and leave the Regulated Area through the Worker Decontamination Enclosure System, leaving contaminated protective clothing in the Equipment Room for reuse or disposal of as asbestos contaminated waste. No one shall eat, drink, smoke, chew gum or tobacco, or apply cosmetics while in a Regulated Area.
- D. During removal, the Contractor shall spray asbestos materials with amended water using airless spray equipment capable of providing a "mist" application to reduce the release of airborne fibers. Spray equipment shall be capable of mixing wetting agent with water and capable of generating sufficient pressure and volume. Hose length shall be sufficient to reach all of the Regulated Area. Do not "flood" the area with hose type water supply equipment with the potential to create water releases from the regulated area.
- E. The Contractor shall continue to spray the asbestos materials with amended water, as necessary, throughout removal activities to ensure the asbestos materials remain adequately wet. The asbestos materials shall not be allowed to dry out.

- F. In order to minimize airborne asbestos concentrations inside the Regulated Area, the Contractor shall remove the adequately wetted asbestos in manageable sections. In addition, asbestos materials removed from any elevated level shall be carefully lowered to the floor.
- G. The Contractor shall promptly place the adequately wet asbestos material in disposal containers (six (6) mil polyethylene bags/fiber drum/poly-lined dumpsters, etc.) as it is removed. Large components removed intact may be wrapped in two (2) layers of six (6) mil polyethylene sheeting secured with tape. As the disposal containers are filled, the Contractor shall promptly seal the containers, apply caution labels and clean the containers before transportation to the equipment decontamination area. Bags shall be securely sealed to prevent accidental opening and leakage by taping in gooseneck fashion. Small components and asbestos-containing waste with sharp-edged components (e.g. nails, screws, metal lath, tin sheeting) which could tear polyethylene bags and sheeting shall be placed in clean drums and sealed with locking ring tops. All waste containers shall be leak-tight, (typically consisting of two layers of 6 mil poly (or bags)), and shall be properly labeled and placarded with OSHA Danger labels, DOT shipping labels, markings and placards and USEPA NESHAP generators labels. Containers shall be decontaminated by wet cleaning and HEPA vacuuming within the equipment decontamination area prior to exiting the regulated area. Wet clean each container thoroughly before moving to Holding Area.
- H. If at any time during asbestos removal, the Project Monitor should suspect contamination of areas outside the Regulated Area, the Contractor shall immediately stop all abatement work and take steps to decontaminate these areas and eliminate causes of such contamination. Unprotected individuals shall be prohibited from entering contaminated areas until air sampling and/or visual inspections determine decontamination.
- I. After completion of abatement work, all surfaces from which asbestos has been removed shall be wet brushed, using a nylon brush, wet wiped and sponged or cleaned by an equivalent method to remove all visible material (wire brushes are not permitted). During this work the surfaces being cleaned shall be kept wet. Cleaning shall also include the use of HEPA filtered vacuum equipment.

### 3.10 CLEAN-UP PROCEDURES

- A. The Contractor shall also remove and containerize all visible accumulations of asbestos-containing and/or asbestos-contaminated debris which may have splattered or collected on the polyethylene engineering controls/barriers.
- B. The Contractor shall clean surfaces of contaminated containers and equipment thoroughly by vacuuming with HEPA filtered equipment and wet sponging or wiping before moving such items into the Equipment Decontamination Enclosure System for final cleaning and removal to uncontaminated areas.
- C. The Contractor shall remove contamination from the exteriors of the air filtration devices, scaffolding, ladders, extension cords, hoses and other equipment inside the Regulated

Area. Cleaning may be accomplished by brushing, HEPA vacuuming and/or wet cleaning. The Contractor shall wet wipe the Regulated Area beginning at the point farthest away from the negative air filtration units using cotton rags or lint free paper towels. Rags and towels shall be disposed of after each use. Workers should avoid the use of dirty rags to insure proper cleaning of surfaces. Mop the entire floor with a clean mop head and amended water. Water shall be changed frequently. For those Regulated Areas where lead is also disturbed, the cleaning shall also include a wet washing with a high phosphate detergent solution and HEPA vacuuming. Waste water shall be filtered using best available technology into leak-proof containers prior to being transported to a sanitary sewer for discharge.

- D. Once the Regulated Area surfaces have dried, the Project Monitor shall perform a thorough post abatement visual inspection utilizing protocols from the ASTM Standard E1368-90 *Standard Practice for Visual Inspection of Asbestos Abatement Projects*. All surfaces within the Regulated Area, including but not limited to ledges, beams, and hidden locations shall be inspected for visible residue. Evidence of asbestos contamination identified during this inspection will necessitate further cleaning as heretofore specified. The area shall be re-cleaned at the Contractor's expense, until the standard of cleaning is achieved.
- E. Once the area has received a satisfactory post-abatement visual inspection, any equipment, tools or materials not required for completion of the work, shall be removed by the Contractor from the Regulated Area. Negative air filtration devices shall remain in place and operating for the remainder of the clean-up operation.
- F. Following the post-abatement visual, the Contractor shall apply a lock-down encapsulant to all surfaces within the Regulated Area from which asbestos has been removed and the cleaned inner layer of polyethylene.

### 3.11 AIR MONITORING REQUIREMENTS

- A. The Contractor shall:
  - 1. Provide air monitoring equipment including sample filter cassettes of the type and quantity required to properly monitor operations and personnel exposure surveillance throughout the duration of the project.
  - 2. Conduct personnel exposure assessment air sampling, as necessary, to assure that workers are using appropriate respiratory protection in accordance with OSHA Standard 1926.1101. Documentation of air sampling results must be recorded at the work site within twenty-four (24) hours and shall be available for review until the job is complete.
- B. The Project Monitor, acting as the representative of the Engineer during abatement activities, will:
  - 1. Collect air samples in accordance with the current revision of the NIOSH 7400 Method of Air Sampling for Airborne Asbestos Fibers while overseeing the

activities of the Abatement Contractor. Frequency and duration of the air sampling during abatement will be representative of the actual conditions at the abatement site. The size and configuration of the asbestos project will be a factor in the number of samples required to monitor the abatement activities and shall be determined by the Project Monitor. The following schedule of samples may be collected by the Project Monitor:

- a. Pre-Abatement (Optional)
  - i. Background areas
  - ii. Area(s) adjacent to Work Area(s)
  - iii. Work Area(s)
  
- b. During Abatement (Optional)
  - i. At the exhaust of air filtering device
  - ii. Within Regulated Area(s)
  - iii. Area(s) adjacent to Regulated Areas(s)  
(exterior to critical barriers)
  - iv. At the Decontamination Enclosure System
  
- c. Post-Abatement (reoccupancy air clearance testing) **(REQUIRED)**
  - i. Interior Regulated NPE Area - At least five (5) per homogenous area

Abatement Activity	Pre- Abatemen t	During Abatemen t	Post- Abatemen t
Greater than 1500 SF/500 LF – Interior	PCM	PCM	TEM
Greater than 3 LF/3 SF and Less than 1500 SF/500 LF – Interior	PCM	PCM	PCM
Spot Removal and Glovebag Procedures (<3 LF/3 SF)	---	PCM	---
Exterior Friable/Non-Friable	---	PCM	---

- C. If air samples collected outside of the Regulated Area during abatement activities indicate airborne fiber concentrations greater than original background levels, or greater than 0.1 f/cc, as determined by Phase Contrast Microscopy, whichever is larger, an examination of the Regulated Area perimeter shall be conducted and the integrity of barriers shall be restored. Cleanup of surfaces outside the Regulated Area using HEPA vacuum equipment or wet cleaning techniques shall be done prior to resuming abatement activities.

**3.12 POST-ABATEMENT REOCCUPANCY PROCEDURES**

- A. For interior NPE Regulated Areas, clearance air sampling will be performed by the Project Monitor as specified in the Air Sampling Schedule. Clearance sampling will be undertaken using aggressive sampling techniques. Sampling and analysis of clearance samples will follow State of Connecticut Regulations, Section 19a-332a-12. Areas which do not comply shall continue to be cleaned by and at the Contractors expense, until the

specified Standard of Cleaning is achieved as evidenced by results of air testing. When the Regulated Area passes the re-occupancy clearance, controls established by these Specifications may be removed.

1. Air sampling will not begin until after the area has received an acceptable post abatement visual inspection, encapsulation has been completed, and no visible water, liquid encapsulant or condensation remain in the Regulated Area.
2. Sampling equipment will be placed at random throughout the Regulated Area.
3. The following aggressive air sampling procedures will be used within the Regulated Area during all air clearance monitoring:
  - a. Before starting the sampling pumps, direct the exhaust from forced air equipment (such as a 1 horsepower leaf blower) against all walls, ceilings, floors, ledges and other surfaces in the Regulated Area.
  - b. Pre-calibrate the sampling pump flow rates through the use of a rotameter calibrated to a primary standard.
  - c. Start the sampling pumps and sample for the required time.
  - d. Post-calibrate the sampling pump flow rates.
4. Air volumes taken for clearance sampling shall be sufficient to accurately determine (to a 95 percent probability) fiber concentrations to 0.010 f/cc of air (1,200 liters).
5. Analysis shall follow the requirements of CTDPH 19a-332a-12.
6. Each homogeneous Regulated Area which does not meet the clearance criteria shall be thoroughly recleaned using HEPA vacuuming and/or wet cleaning, with the negative pressure ventilation system in operation. New samples shall be collected in the Regulated Area as described above. The process shall be repeated until the Regulated Area passes the test, with the cost of repeat sampling being borne entirely by the Contractor.
7. For an asbestos abatement project with more than one homogeneous Regulated Area, the release criterion shall be applied independently to each Regulated Area.
8. These clearance sampling procedures may also be implemented for exterior NPE work areas at the discretion of the Engineer.

### 3.13 POST ABATEMENT WORK AREA DEREGULATION

- A. The Contractor shall remove all remaining polyethylene, including critical barriers, and Decontamination Enclosure Systems leaving negative air filtration devices in operation. HEPA vacuum and/or wet wipe any visible residue which is uncovered during this process. All waste generated during this disassembly process shall be discarded as ACM waste.

- B. A final visual inspection of the work area shall be conducted by the Competent Person and the Project Monitor to ensure that all visible accumulations of suspect materials have been removed and that no equipment or materials associated with the abatement project remain.
- C. The Contractor shall restore all work areas and auxiliary areas utilized during work to conditions equal to or better than original. Any damage caused during the performance of the work activity shall be repaired by the Contractor at no additional expense to the Engineer.

### 3.14 WASTE DISPOSAL

- A. Unless otherwise specified, all removed materials and debris resulting from execution of this project shall become the responsibility of the Contractor and removed from the premises. Materials not scheduled for reuse shall be removed from the site and disposed of in accordance with all applicable Federal, State and Local requirements.
- B. Waste removal dumpsters and cargo areas of transport vehicles shall be lined with a layer of six (6) mil polyethylene sheeting to prevent contamination from leaking or spilled containers. Floor sheeting shall be installed first, and shall be extended up sidewalls 12-inches. Wall sheeting shall overlap floor sheeting 24-inches and shall be taped into place.
- C. OSHA "Danger" signs must be attached to vehicles used to transport asbestos-containing waste prior to loading ACM waste. The signs must be posted so that they are plainly visible.
- D. Waste haulers and disposal facilities utilized shall match those indicated on the submitted CTDPH notification.
- E. Ensure all waste containers (bags, drums, etc.) are properly packed, sealed and labeled with USEPA NESHAP generator labels, OSHA danger labels and DOT shipping labels. For each shipment of ACM waste, the Contractor shall complete an EPA-approved asbestos waste shipment record.
- F. Authorized representatives signing waste shipment records on behalf of the generator must have USDOT Shipper Certification training in accordance with HMR 49 CFR Parts 171-180.
- G. Transport vehicles hauling ACM waste shall have appropriate USDOT placards visible on all four (4) sides of the vehicle.
- H. The Contractor shall dispose of asbestos-containing and/or asbestos contaminated material at an EPA authorized site and must be in compliance with the requirements of the Special Waste Provisions of the Office of Solid Waste Management, Department of Environmental Protection, State of Connecticut, or other designated agency having jurisdiction over solid waste disposal.

- I. Any asbestos-containing and/or asbestos-contaminated waste materials which also contain other hazardous contaminants shall be disposed of in accordance with the EPA's Resource Conservation and Recovery Act (RCRA), CTDEEP and ConnDOT requirements. Materials may be required to be stored on-site and tested by the Project Monitor to determine proper waste disposal requirements.

END OF SECTION 02 82 13





**BULK ASBESTOS ANALYSIS REPORT**

CLIENT: CT Department of Construction Services

Lab Log #: 0044709  
 Project #: 224720.0003.0000  
 Date Received: 10/13/2014  
 Date Analyzed: 10/13/2014

Site: NVCC, Founders Hall, Waterbury, CT

**POLARIZED LIGHT MICROSCOPY by EPA 600/R-93/116**

Sample No.	Color	Homogenous	Multi-Layered	Layer No.	Other Matrix Materials	Asbestos %	Asbestos Type
1	Black	Yes	No	--	---	20%	Chrysotile
2	--	--	--	--	--	NA/PS	--

Reporting limit- asbestos present at 1%  
 ND - asbestos was not detected  
 Trace - asbestos was observed at level of less than 1%  
 NA/PS - Not Analyzed / Positive Stop

Note: Polarized-light microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. In those cases, negative results must be confirmed by quantitative transmission electron microscopy.

The Laboratory at TRC follows the EPA's Interim Method for the Determination of Asbestos in Bulk Insulation (1982), and the EPA recommended Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116), July 1993, R.L. Perkins and B.W. Harvey which utilizes polarized light microscopy (PLM). Our analysts have completed an accredited course in asbestos identification. TRC's Laboratory is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP), for Bulk Asbestos Fiber Analysis, NVLAP Code 18/A01, effective through June 30, 2015. TRC is an American Industrial Hygiene Association (AIHA) accredited lab for PLM effective through October 1, 2014. Asbestos content is determined by visual estimate unless otherwise indicated. Quality Control is performed in-house on at least 10% of samples and the QC data related to the samples is available upon written request from the client.

This report shall not be reproduced, except in full, without the written approval of TRC. This report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government. This report relates only to the items tested.

Analyzed by: *Amanda Parkins*  
 Amanda Parkins, Laboratory Analyst

Reviewed by: *Kathleen Williamson*  
 Kathleen Williamson, Laboratory Manager

Date Issued  
 10/13/2014

**TRC LABORATORY ASBESTOS ANALYTICAL ACCREDITATIONS**

NVLAP Lab Code 101424-0 AIHA #100122 CT #PH-0426 ME LA-0075, LB-0071 MA #AA000052 NY #10980 WV#LT000356  
 RI #AAL-007C3 TX #300354 VT #AL014538 VA #3333 000283 AZ #A20944 III #L-09-004 NJ #CT004 CA #10275CA



**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. The General Conditions and Supplementary General Conditions shall form a part of this and all other sections of the specifications.
- B. Specification 03 21 00 Concrete Reinforcing
- C. Specification 03 30 00 Cast in Place Concrete
- D. Specification Section 01 20 00 Contract Considerations for Unit Prices

**1.2 DESCRIPTION**

- A. Furnish all labor, materials, equipment and services necessary to install concrete piles required for the foundations of this building as shown on the drawings or as specified herein.
- B. Any item of labor, material or equipment not specified in detail by the specifications or indicated in the drawings, but which are incidental to or necessary for the complete installation of the caisson work shown by the accompanying drawings, or described herein, or reasonably implied in connection therewith, shall be furnished as if called for in detail by either the specifications or drawings.

**1.3 QUALITY CRITERIA**

- A. Cast-in-place piles shall be installed by a contractor who has specialized in this type of work for not less than five years.
- B. All work of this section shall comply with the latest edition of the following standards which are considered to be a part of this section the same as if fully set forth herein:
  - 1. Standard Specification for Structural Steel, ASTM A36.
  - 2. Standard Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement, ASTM A615.
  - 3. Standard Specification for Compressive Strength of Cylindrical Concrete Specimens, ASTM C39.
  - 4. Specifications for Structural Concrete for Buildings, ACI 301.
  - 5. Building Code Requirements for Reinforced Concrete, ACI 318.
  - 6. Standard Specification for the Construction of End Bearing Drilled Piers, ACI 336.1.
  - 7. State of Connecticut Building Code.

- C. The Owner at his expense, will provide the services of Testing Laboratory, who will inspect the entire pile operation, and approve the bearing surfaces and the placement of concrete in accordance with ACI 336.
- D. The Owner at his expense, will employ a testing laboratory which will provide services conforming to the requirements of ASTM E329, for sampling, testing, inspecting, and reporting with respect to reinforcing and concrete and conforming to ACI 301.

#### **1.4 SUBMITTALS**

- A. Contractor shall submit reinforcing steel shop drawings for review prior to beginning work.
- B. Contractor shall submit for review concrete mix designs and data which shows that proposed materials and mix design conform to all requirements of "Specifications for Structural Concrete for Buildings".
- C. Contractor shall submit for review detailed procedure for caisson installation including but not limited to: dewatering procedures, casing removal, and concrete placement.

#### **PART 2 - PRODUCTS**

##### **2.1 MATERIALS**

- A. Steel casing shall be ASTM A36 steel or equivalent.
- B. Reinforcing steel shall be ASTM A615, Grade 60 steel.
- C. Concrete work shall conform to all requirements of "Specifications for Structural Concrete for Buildings, ACI 301.
- D. Concrete shall have a strength of not less than 4000 psi at 28 days, normal weight, with a maximum slump of 6 inches and shall contain a retarder to prevent arching of concrete during casing pulling.
- E. Maximum size of coarse aggregate shall be 1-1/2 inches.

#### **PART 3 - EXECUTION**

##### **3.1 EXCAVATION**

- A. In drilling the piles, the walls shall be adequately and securely protected against cave-ins, displacement of the surrounding earth, and the retention of ground water by means of temporary steel cylinder liners or casings.
- B. Shafts shall be circular in cross section and shall have a net diameter as called for on the drawings.
- C. Bottom of piles shall be level with the bottom of the rock core and socketed into and shall bear on solid bedrock.

**3.2 INSPECTION**

- A. The Testing Laboratory will certify that the cast-in-place pile bearing and installation comply with the requirements of the Specifications. Each pile will be inspected and approved prior to placing of concrete.
- B. The contractor will provide visible means of inspecting bottom of each pile by the Engineer with either remote cameras or other suitable methods without his having to be lowered into the bottom of the hole.
- C. If the testing and inspection results indicate the stratum is not capable of providing the required service load bearing pressure, the Engineer will be notified for a determination of adjustments to be made. These may include, but not be limited to advancing the shaft length for the appropriate bearing pressure.

**3.3 STEEL CASING**

- A. Provide steel casing for shaft excavation if required for stability of subsoils. Provide casing of sufficient strength to withstand handling stresses, concrete pressure, and surrounding earth and/or fluid pressures. Make diameter of excavation in relation to diameter of casing, such as to create a minimum of void space outside of casing.
- B. Casing shall be augured into place.
- C. Casing shall be removed during concreting operation, following the requirements specified in 3.5 G & H.

**3.4 REINFORCING STEEL**

- A. Place reinforcement for drilled piers in accordance with the contract documents.
- B. Use reinforcement at time of placement which is free of mud, oil, or other coatings that adversely affect bond.
- C. Reinforcement with rust, scale, or a combination of both may be used provided the minimum dimensions, including height of deformations and weight of wire bushed specimens, are not less than required by applicable ASTM specifications. Inspecting Engineer will determine acceptability of such reinforcement.
- D. Use metal reinforcement without kinks or non-specified bends. Straighten or repair bars in a manner that will not damage bars or adjacent construction.
- E. Place bars as shown on contract drawings with cover of not less than 3 in. where exposed to soil.
- F. Provide clear distance between bars of not less than one and one-half times the bar diameter nor one and one-half times the maximum aggregate size.

**3.5 PLACING OF CONCRETE**

- A. Bottom of cast-in-place pile shall be cleaned of all loose material prior to placing concrete. **All piles are to be socketed a minimum of 2 feet into solid rock.**
- B. Dewater drilled pier excavation prior to placing concrete. Perform pumping in manner that will not create ground loss problems that might adversely affect this and existing adjacent structures. All water shall be pumped from bottom of excavation before concrete is placed. Amount of water to be allowed shall not exceed two inches in depth.
- C. A tremie concrete procedure is to be utilized when piles can not be dewatered. The entire procedure to be utilized is to be submitted to the engineer for approval.
- D. Obtain approval of Engineer prior to placing concrete.
- E. Place concrete immediately after completion of excavation and after Engineer has verified allowable service load bearing capacity. Do not leave excavations open overnight.
- F. Free fall concrete may be used provided it is directed through a hopper, or equivalent, such that fall is vertical down center of shaft without hitting sides or reinforcing.
- G. Place concrete in pier in one continuous operation. Interrupted pours will not be permitted.
- H. Withdraw casing only as shaft is filled with concrete. Maintain adequate head of concrete at all times during withdrawal of casing to balance outside soil and water pressure above the bottom of the casing and to prevent extraneous material from falling in from sides and mixing with the concrete. Specific procedures that the Contractor will follow to accomplish this objective shall be submitted for approval.
- I. Vibration of concrete is required only in the area of the reinforcing. Final vibrating of concrete shall take place after casing is pulled.
- J. Where two cast-in-place piles are spaced relatively close together, one shall be drilled, poured, and concrete permitted to set 36 hours prior to drilling of the other hole.
- K. Take one set of three cylinders per pile. Test one sample at 7 days and two at 28 days.
- L. The theoretical volume of concrete required to fill the pile shall be computed by the Testing Laboratory and if the actual volume installed is appreciably less than the theoretical volume, the pile shall be inspected for possible pinching, collapse or segregation. The contractor shall submit methods of inspection and review of these methods will be by the Engineer. The inspection will be at the contractors expense.

### 3.6 TOLERANCES

- A. The maximum permissible variation of location of the center of each pile at the top shall not vary from the designed center by more than 1/24th of the shaft diameter.

- B. The concrete shafts shall be out of plumb not more than 1.5 percent of the length nor exceeding 12.5 percent of shaft diameter or 6 in., whichever is less. This shall be determined prior to placing concrete.
- C. The top of pile elevation tolerance shall be plus 1 inch to minus 3 inches.
- D. The actual elevations, locations and plumbness referred to in 3.6A-C above shall be determined by a Licensed Surveyor registered with the State of Connecticut and in the employment of the Pile Contractor.
- F. Where tolerances specified above are exceeded, the Contractor shall remove the work or undertake corrective measures, with the approval of the Engineer, without of additional design resulting from exceeding specified tolerances.

### **3.7 SURVEY**

- A. Before any subsequent work is placed on any pile, its actual location, alignment, elevation and dimensions shall be verified by the above mentioned Licensed Surveyor.
- B. If the location is within specified tolerances, subsequent work shall proceed; otherwise, the Engineer shall be notified and subsequent work postponed until appropriate instructions have been issued by him.

### **3.8 RECORDS**

- A. The Pile Contractor shall keep an accurate daily record of the pile work performed.
- B. The record shall show top and bottom elevations as built, shaft diameters, date pile is excavated, placed and any other pertinent data.
- C. A copy of daily records shall be filed with the Engineer weekly.
- D. The Testing Laboratory shall submit a daily report in accordance with ACI 336.3R.

### **3.9 METHOD OF MEASUREMENT**

- A. Bid prices are to be based on estimated lengths indicated on the contract documents for both total embedded length and length of rock socket.
- B. See Specification Section 01 20 00 Contract Considerations to adjust the costs for either added or subtracted quantities from those shown above. Measurement shall start at top of caisson.

**END OF SECTION**