

ATTACHMENT C

Technical Specifications Asbestos Abatement Tennessee Technological University

ASBESTOS REMOVAL, DISPOSAL, AND CLEANING SPECIFICATIONS

Contractor will be required to meet or exceed the quality standards established by the National Institute Occupational Safety and Health (NIOSH), however, University approval of or acceptance of various construction activities or methods proposed by Contractor does not constitute an assumption of liability by the University for inadequacy or adverse consequences of said activities or methods. Standards that must be met are as noted below:

DISPOSAL SITES

ASBESTOS & ASSOCIATED DEBRIS:

The Asbestos Containing Materials (ACMs) must be disposed of at an asbestos approved sanitary landfill for the friable materials and at either an asbestos approved sanitary landfill or at a landfill that has been properly notified that non-friable ACMs and associated debris are being disposed of at their site for the non-friable materials. The Contractor selected for the work must make appropriate arrangements for disposal based on the notification requirements listed. The Contractor must also submit to the University disposal manifests, shipping papers, or similar instruments identifying the disposal facility, amount, and disposal location. All disposal fees are to be paid by Contractor.

QUALITY ASSURANCE:

All asbestos removal and related work shall be accomplished by a Contractor (or subcontractor) specializing in, and having a record of, not less than two years successful experience in asbestos removal and related work. The Contractor's superintendent shall have not less than one year of full-time experience in responsible charge of asbestos removal operations within the 24-month period preceding the start of this project. The training of the superintendent shall be in compliance with current EPA regulations. The Contractor and all of the Contractor's workers must be certified as required by the Tennessee Department of Environment and Conservation, Division of Solid and Hazardous Waste Management, in State Regulation 1200-01-20, Asbestos Accreditation Requirements.

REGULATORY REQUIREMENTS:

All work shall be in strict compliance with the current issues of federal, state, and local regulations, codes, and standards as listed below:

U.S. Environmental Protection Agency (EPA) Standards for Asbestos (Code of Federal Regulations Title 40, Part 61, Sub-Part M);

U.S. Environmental Protection Agency (EPA) National Emissions Standards for Hazardous Air Pollutants (NESHAPS);

U.S. Department of Labor Occupational Safety and Health Administration (OSHA) Asbestos Standards (Code of Federal Regulations Title 29, Part 1926, Section 1926.1101);

Title 29, Code of Federal Regulations, Section 1910.1001. Occupational Safety and Health Administration (OSHA), U.S. Department of Labor;

Title 29, Code of Federal Regulations, Section 1910.134. Occupational Safety and Health Administration Respiratory Protection Standard;

Section 6, Toxic Substance Control Act (TSCA);

Title 29, Code of Federal Regulations, Part 1926, Occupational Safety and Health Administration Construction Standards;

Hazard Communication Standard – Title 29, Code of Federal Regulations, Part 1910, Section 1200;

Specifications of Accident Prevention, Signs and Tags – Title 29, the Code of Federal Regulations, Part 1910, Section 145;

U.S. Department of Transportation (DOT), included, but not limited to: Hazardous Substance – Title 49, Codes of Federal Regulations, Part 171 and 172;

All attachments, memorandums and information sheets submitted by Federal, State, and Local agencies;

All State, County, and City codes and ordinances are applicable. Provide one copy of EPA, OSHA, State and City Regulations governing the work available for review at the site.

TEST REPORTS:

Results of tests of asbestos-containing materials (which are specifically excluded as a part of this contract) taken from surfaces within the scope of this project may be available for review at the office of Facilities and Business Services; however, the Contractor is cautioned that, should interpretations be made, opinions be formed, and conclusions be drawn as a result of examining the test results, those interpretations, opinions, and conclusions will be those made, formed, and drawn solely by the Contractor.

The University makes no representation, warranty, nor guarantee that the conditions indicated by the test reports either are representative of those conditions existing throughout the area, or that unforeseen development may not occur, or that materials other than, or in proportions different from, those indicated may not occur.

SUBMITTALS:

Prior to Commencement of Work Contractor shall:

Submit notice of impending commencement of asbestos removal work in writing to the following agencies no fewer than ten (10) days before work commences on project. Copies of notice submittals must be provided to the University.

Tennessee Department of Health & Environment
Division of Solid Waste Management
Fifth Floor, L & C Annex
401 Church Street
Nashville Tennessee 37243

Tennessee Department of Health & Environment
Division of Air Pollution Control
Ninth Floor, L & C Annex
401 Church Street
Nashville, Tennessee 37243

Submit for review by the University documentation that all required permits, site location, and arrangements for transport and disposal of asbestos containing or contaminated materials, supplies,

and the like have been obtained. Documentation must be presented to the University one week prior to the beginning of any work activities.

Submit for review by the University a written description, sketch, or combinations thereof of the plans for construction of a worker, visitor and equipment decontamination enclosure system(s) and for isolation of the work areas in compliance with this specification and applicable regulations.

Submit for review by the University documentation that all employees have had instruction on the hazards of asbestos exposure use, fitting of respirators, protective dress, use of showers, entry and exit from work areas and on all aspects of work procedures and protective measures.

Submit for review by the University a written description, sketch, or combination thereof of the security procedure plan.

The Contractor shall submit to the University two (2) copies of project documentation that have been bound and prepared in the best quality binder within twenty-one (21) days of contract completion.

PRODUCT HANDLING:

In performance of work as part of this Contract, Contractor shall:

Deliver all materials as described above in the original packages, containers, or bundles bearing the name of the manufacturer(s) and the brand name(s).

Store all materials subjected to damage off the ground, away from wet or damp surfaces, and under cover sufficient to prevent damage or contamination.

Remove from the premises all damaged and deteriorating materials. Dispose of materials that become contaminated with asbestos in accordance with applicable regulatory standards.

The Contractor shall be responsible for the purchase and delivery of the equipment indicated to be supplied by the Contractor. It shall be the Contractor's responsibility to schedule the delivery of the material and equipment at such stages of the work as it will permit uninterrupted process of the work. These delivered materials must be put in the Contractor's name and delivered to the Contractor/site. University will not accept responsibility for Contractor's shipments.

WORK SITE CONDITIONS AND GENERAL PROTECTION OF PERSONS:

Worker and Visitor Procedures

The Contractor is hereby advised that asbestos has been determined to be a **CANCER CAUSING AGENT** and Contractor shall provide workers and visitors with adequate respirators and protective clothing during preparation of system of enclosures, prior to commencing and during actual asbestos abatement, and until final clean-up is completed.

Prior to commencement of work all workers shall be instructed and shall be knowledgeable in appropriate procedures of personnel protection during asbestos removal.

Contractor shall be solely responsible for enforcing worker protection requirements.

Contractor shall provide workers with personally issued and marked respiratory equipment approved by NIOSH or MSHA and meeting specifications of OSHA. This respiratory equipment shall be suitable for the asbestos exposure level in the controlled areas according to OSHA Standard 29 CFR 1926.1101 as identified by the University and/or as

more stringently specified otherwise in these specifications. Provide disposable HEPA filters as required, with sufficient filters for replacement.

Contractor shall provide workers, University personnel and authorized visitors with sets of protective disposable clothing, head covers, gloves, eye protection and foot covers of sizes to properly fit individual workers and visitors whenever they are required to enter the controlled area. Provide a minimum of four sets per day for visitors and sufficient sets as required for workers and University personnel.

Reporting Unusual Events: When an event of unusual and significant nature occurs at the site, prepare and submit a special report listing chain of events, persons participating, response and similar pertinent information. When such events are known or predictable in advance, advise University in advance, at earliest possible date.

Reporting Accidents: Prepare and submit reports of significant accidents, at site and anywhere else work is in progress to proper state or federal officials. For this purpose, a significant accident is defined to include events where an OSHA recordable event occurs, non-contractor personnel are injured, and/or property loss of substance is sustained.

Contractor shall post telephone numbers and locations of emergency services including, but not limited to, fire, ambulance and police at the entrance to the decontamination unit.

SPECIFIC PROTECTION OF WORKERS:

Respirators shall be selected and used in accordance with manufacturer's recommendations, and shall be approved by National Institute for Occupational Safety and Health (NIOSH) for use in environments containing airborne asbestos fibers. Personnel who handle ACM, enter asbestos regulated controlled areas that require the wearing of a respirator, or who are otherwise carrying out abatement activities that require the wearing of a respirator, shall be provided with approved respirators that are fully protective of the worker at the measured or anticipated airborne asbestos concentration level to be encountered. Respiratory protection shall comply with the CFR 29 Part 1926, and CRF 29 Part 1910.

In All Removal Areas

Workers shall always wear a respirator properly fitted on the face while in the removal areas. Workers wearing tight-fitting face pieces shall be clean-shaven to the extent that the hair does not interfere with the sealing surface of the respirator. This must be documented by a standard respirator fit test.

The Contractor shall instruct and train workers in the proper respirator use.

Workers shall wear disposable, full-body coveralls and disposable head covers and footwear suitable for asbestos work in the removal areas.

Workers shall not eat, drink, smoke, chew gum, tobacco, or apply cosmetics in the

removal areas.

The Contractor shall provide a fit tested respirator and disposable coveralls, head cover, and footwear to any official representative(s) of the University who inspect(s) the project.

All persons entering the removal areas shall wear an approved respirator and disposable coveralls, head cover and footwear.

Contractor shall instruct and train workers in the nature of asbestos and the hazards related to asbestos exposure during removal and/or disturbance work.

The Contractor shall set up a decontamination unit as follows:

Set up a unit consisting of a change room, shower and equipment room, enclosed and separated by triple-flap polyethylene air locks, connected to the controlled areas. All workers, without exception, shall:

Remove and properly store street clothes in the change room and put on new disposable coveralls, head covers, footwear and cleaned respirators before entering the controlled area.

Upon leaving the controlled area, remove the disposable coveralls, head covers and footwear in the equipment room and dispose of them in an appropriate waste container. Still wearing their respirators, workers shall proceed to the shower and remove their respirators while showering with soap and tempered water. Wetted HEPA respirator cartridges shall be disposed of in appropriate containers.

This procedure shall be followed each time a worker enters or leaves the controlled area.

MATERIAL:

Contractor shall provide the following:

4-mil and 6-mil fire-retardant polyethylene sheets in sizes to minimize the frequency of joints.

Tape: Glass fiber or other type capable of sealing joints of adjacent plastic sheets and for attachment of plastic sheet to finished or unfinished surfaces of dissimilar materials under both dry and wet conditions.

Surfactant (Wetting Agent) and Sealants: Shall consist of materials which are non-toxic and non-irritating to skin and eyes, and non-carcinogenic.

Impermeable Containers: Air and water-tight, suitable to receive and retain any asbestos-containing or contaminated materials until disposal at an approved site, and labeled in accordance with OSHA Regulation 29 CFR 1910.1001 and 29 CFR 1926.1101 as well as EPA regulation 40 CFR Part 61, 29 CFR 1910.145, and 49 CFR 172, 173, 178 and 179. Two types of impermeable containers shall be used:

Six mil plastic bags sized to fill within the drum.

Metal or fiber drums with tightly fitting lids, or any other air tight disposal containers sufficient to meet DOT requirements. On large projects contractors may place a 40-yard bag into a construction debris container.

Warning Labels and Signs: In conformance with OSHA regulation 29 CFT 1926.1101 (asbestos), DOT regulation Title 49, Part 171 and 172 of the Codes of Federal Regulations, and EPA regulation Title 40, Part 61, Sub-Part M.

Other Materials: Provide all other materials, such as lumber, nails, and hardware, which may be required to construct and dismantle the decontamination area and the barriers that isolate the controlled area.

High Efficiency Purifying Air (HEPA) Vacuums: For cleaning residual dust at the area of removal.

Scaffolding: Provide all scaffolding, ladders and/or staging, etc., as necessary to accomplish the work of this contract. Scaffolding may be suspension type; or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of all scaffolding shall comply with all applicable OSHA provisions.

Differential Pressure Recorder to verify and record containment remains negative.

Execution:

The following two (2) categories of Controlled Areas may exist during the execution of this contract. The categories and the asbestos-containing materials that may be removed under each category are as follows:

Full Containment

- Pipe insulation (if gross removal is performed);
- Pipe Joint Compound (if gross removal is performed);
- Dropped or Suspended Ceiling Tile;
- Spray-applied Ceiling Material; and
- Plaster over Concrete.

Limited Containment

- Pipe Insulation (if glove bag or wrapping removal is performed);
- Pipe Joint Compound (if glove bag or wrapping removal is performed); and
- Vinyl Floor Tile & Associated Mastic Adhesive.

Controlled Area Preparation:

In ALL controlled Areas, the Contractor shall:

Ensure that all ventilating systems or any other system bringing air into or out of the controlled area is disabled. Disable systems by disconnecting wires, removing circuit breakers, lockable switches or other positive means that will prevent accidental restarting of the equipment.

Lockout power to circuits running through the controlled area whenever possible by switching off all breakers or removing fuses serving these circuits. Label breakers with tape over breaker with notation, "DANGER circuits being worked on." Lock panel and have all keys under control of Contractor's superintendent. If circuits cannot be shut down for any reason, label at intervals 4-feet 0-inches on center with tags reading, "DANGER live electric circuit. Electrocution Hazard." Label circuits that are in hidden locations but which may be affected by the work in a similar manner.

Isolate the controlled area to prevent entry by unauthorized personnel into the area by placing opaque polyethylene barriers at each entrance to the area and by providing warning signs at each locked door leading into the controlled area. The signs shall be 1'-2" X 1'-8" in dimension, and shall read as follows:

**LEGEND
DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED
IN THIS AREA**

The graphic symbol for "No Admittance," which depicts a circled open hand, shall be attached near the "Danger" command on this sign.

Construct any and all necessary, temporary walls to completely isolate the area of asbestos disturbance.

Critical Barriers: Seal all openings (doors, windows, etc.) with a 6-mil (minimum) polyethylene containment barrier to prevent leakage of air into the outside environment or other portions of the building.

Pre-clean immovable objects, such as mechanical and electrical equipment within any proposed removal area, using HEPA vacuum equipment and/or wet cleaning methods as appropriate.

Carefully dismantle any fan covers, grilles or other mechanical items necessary to remove or clean asbestos-containing finishes.

Prior to placing plastic sheeting, clean the controlled areas using HEPA vacuum equipment or wet cleaning methods as appropriate. Do not use methods that raise dust such as broom or standard vacuum sweeping.

Seal off all openings to areas not receiving asbestos removal with plastic sheeting sealed with tape. Seal electrical panels with two layers of plastic prior to placement of wall plastic.

The Contractor shall establish emergency exits and procedures for the removal area, satisfactory to fire officials.

In Full Containment areas, the Contractor shall prepare the area in accordance with the following procedures:

Cover the floor of the Controlled area with a minimum of two (2) individual layers of clear polyethylene sheeting, each at least 6-mil in thickness, turned up walls at least 12 inches. Form a sharp right angle bend at junction of floor and wall so that there is no radius that could be stepped on causing the wall attachment to be pulled loose. Both spray-glue and duct tape all seams in floor covering. Locate seams in top layer six feet from, or at right angles to, seams in bottom layer. Install sheeting so that top layer can be removed independently of bottom layer.

Cover all walls in the Controlled area, including "Critical Barrier" sheet plastic barriers, with a minimum of one (1) layer of polyethylene sheeting, at least 4-mil in thickness, mechanically supported and sealed with duct tape. Tape all joints including the joints joining with the floor covering with duct or fiber tape.

Stairs and Ramps: Do not cover stairs or ramps with unsecured sheet plastic. Where stairs or ramps are covered with plastic, provide ¾-inch exterior grade plywood treads securely held in place, over plastic. Do not cover rungs or rails with any type of protective materials.

The Contractor shall set up a decontamination facility connected to the controlled area. Water from the shower shall be filtered with an acceptable asbestos filtering system prior to discharge to the sewer.

Provide sufficient HEPA air filtration units to maintain airflow of at least four complete air changes per hour in the removal area, and a static pressure of greater than or equal to 0.02 inches of water. All pressure differential manometer (or equivalent) readings shall be documented prior to removal of any ACM and continually throughout the duration of the removal. Collection of this data is the sole responsibility of the Contractor. In the event that containment is less than 0.02 inches of water, or other breaches in the containment are noted, work shall stop immediately. The Contractor shall be responsible to conduct air monitoring ensuring that levels are below 0.1 (f/cc) outside of the containment area.

Ensure that barriers and plastic enclosures remain effectively sealed and taped. Inadvertent tears in plastic shall be repaired with fiber tape and the tear covered by plastic applied with spray adhesive, overlapping the tear by six inches on all sides.

In Limited Containment areas, the Contractor shall prepare the area in accordance with the following procedures:

Seal all openings (doors, windows, etc.) with a 6-mil (minimum) polyethylene containment barrier to prevent leakage or air into the outside environment or other portions of the building.

The Contractor shall place a minimum of one (1) layer of 6-mil polyethylene sheeting (drop cloth) beneath the pipe insulation, joint compound and duct tape to be abated. The sheeting shall extend a minimum of ten (10) feet in all directions of the piping where possible.

In vinyl floor tile removal areas, the Contractor shall place a minimum of one (1) layer of 6-mil polyethylene sheeting around the immediate area of removal (along the perimeter of the tiles to be removed). The sheeting shall extend at least five (5) feet beyond the perimeter of the tiles to be removed and shall be fastened down with duct or fiber tape. These surfaces will include floor and walls.

The Contractor shall set up a decontamination facility connected to the controlled area. Water from the shower shall be filtered with an acceptable asbestos filtering system prior to discharge to the sewer.

Provide sufficient HEPA air filtration units to maintain an air flow of at least four complete air changes per hour in the removal area.

Ensure that barriers and plastic enclosures remain effectively sealed and taped. Inadvertent tears in plastic shall be repaired with fiber tape and the tear covered by plastic applied with spray adhesive, overlapping the tear by six inches on all sides.

ACM REMOVAL:

In Full Containment areas, the Contractor shall:

Thoroughly wet asbestos-containing materials prior to removal to reduce fiber dispersal into the air. Accomplish wetting by using a fine spray (mist) of amended water or removal encapsulant. Mist the area sufficiently to wet the material without causing excessive dripping or breaking. Allow time for water or removal encapsulant to penetrate material thoroughly.

If amended water is used, spray material repeatedly during the work process to maintain a continuously wet condition. If a removal encapsulant is used, apply in strict accordance with manufacturer's written instructions.

Mist the entire controlled area during removal procedures with amended water to reduce airborne fiber levels.

Remove wetted asbestos-containing spray applied materials, pipe insulation and pipe joint compound in small sections. Remove the dropped or suspended ceiling tiles intact to minimize breakage. As the sections or tiles are removed, simultaneously pack material into disposal bags. Twist neck of bags, bend over (goose neck) and seal with minimum three wraps of duct tape.

Evacuate air from disposal bags with HEPA filtered vacuum cleaner before sealing.

In Limited Containment areas, the Contractor shall:

Vinyl Floor Tile & Associated Mastic Adhesive Removal:

Utilize water delivered in a fine mist from a hose or garden sprayer during removal of the materials. The mist should cover the immediate removal areas and should not be excessive to a point where standing or ponding water is present.

Remove materials in a manner that will minimize breakage. Materials should not be sanded or sawed.

Upon removal, immediately place the ACMs and associated debris into a 6-mil bag with asbestos "Danger" labels on the outside surface, and seal the bag opening with tape.

Remove the mastic adhesive by mechanical devices or use of a non-toxic mastic remover.

After removal of the ACMs surface shall be wet-cleaned to remove residual accumulated material. After wet-cleaning, surface shall appear free to visible material.

Pipe Insulation & Joint Compound Removal:

Glove bag procedure:

Open the appropriate side of the "glove bag" and insert the necessary removal tools into the attached pouch and seal the bag, over the section pipe insulation to be removed, with fiber tape and staples. The number of staples required will depend on the weight of the debris it must support.

Cut open the side port to allow entry of water wand and HEPA vacuum hose and seal airtight. Finish sealing entire bag to pipe thoroughly with tape.

Remove all insulation from the pipe contained within the bag without disturbing the bag-to-pipe seal. Care must be taken to minimize the dust generation by keeping the insulation wet with amended water.

Wipe the now exposed piping with a scouring pad equivalent, to remove any residual asbestos fibers.

All removal tools should be held in the gloves that can then be pulled outward from the bag. A piece of tape should be used to constrict the "sleeve" to create a bag for the tools made from the glove.

The glove can then be cut off of the bag by cutting through the center of the tape, which will leave both the glove and the sleeve sealed to prevent asbestos fiber escape. This tool pouch is ready for insertion into the next glove bag or into a bucket of water if at day's end.

Evacuate the bag of nearly all air with the suction from the HEPA vacuum while avoiding intake of water into the vacuum hose.

Gather the bag into a tight bundle beneath the attachment point to the pipe and hold this together with fiber tape.

Carefully disconnect the bag from the pipe.

Place "glove bags" into approved asbestos disposal containers.

HEPA vacuum the controlled area to secure any residual asbestos.

Duct Tape Removal

Wrapping Procedure:

Ascertain that the Heating, Ventilating and Air Conditioning units have been shut down and the lines have been bled.

Spray the duct tape with an encapsulant.

With asbestos-free duct or fiber tape, tape the asbestos-containing duct tape so that the asbestos-containing materials are concealed beneath the asbestos-free duct or fiber tape.

Cut sections of the duct at least 6-inches away from the asbestos-containing duct tape on each side and wrap the sections with two (2) layers of 6-mil polyethylene and tape exposed ends of the sections.

Decontaminate the wrapped sections of duct with amended water and HEPA vacuum and remove from the controlled area.

CLEAN-UP FOR CONTROLLED AREAS:

The asbestos containing materials shall be sealed in plastic bags or shall be wrapped in a minimum of two (2) polyethylene sheets (6-mil minimum). Initial bagging of waste shall be supplemented by a secondary containment, either by use of a second bag (6-mil minimum) or by use of a fiber or metal drum. If it appears likely that the waste material will tear the plastic, the bag must be placed into a drum for disposal. Bags and drums shall be marked with the OSHA label prescribed by the applicable OSHA Regulations. The outside of all containers shall be cleaned before leaving the controlled area.

After ACM removal procedures have been completed, the Contractor shall notify the University. The University shall visually observe the areas. Upon completion of the observation, and subsequent approval, a testing firm employed by the Contractor will perform final clearance air sampling. Upon successful completion of the final clearance air sampling, the Contractor shall remove the decontamination enclosure systems. The remaining barriers between contaminated and clean areas and all seals on openings into the controlled area shall be removed and disposed of as contaminated waste.

All plastic sheeting tape, cleaning material, clothing, and all other disposable material used in the asbestos removal operation or items used in the controlled area shall be packed into sealable plastic bags (6-mil minimum). These bags must be marked with the OSHA label prescribed by the OSHA Regulations.

FIELD QUALITY CONTROL:

The Contractor will employ a testing firm to perform pre-, during- and post abatement air sampling as well as the necessary tests required by regulations or codes and standards for the protection of his workers, or other purpose. The testing firm must be approved by the University prior to any work. Any costs associated with testing shall be included in the unit prices given in Attachment 6.0. The University will not be responsible for additional costs for testing unless authorized.