



National Institute of
BUILDING SCIENCES

Third Edition

Asbestos Abatement and Management in Buildings Model Guide Specifications

The National Institute of Building Sciences (NIBS) is a non-governmental, non-profit organization, authorized by Congress to encourage a more rational building regulatory environment and to accelerate the introduction of existing and new technology into the building process.

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Preface

The National Institute of Building Sciences (NIBS) is pleased to publish the third edition of this document, *Asbestos Abatement and Management in Buildings, Model Guide Specifications*, for use by the sectors of the building and environmental communities engaged in asbestos abatement and maintenance and repair activities.

The Institute would like to acknowledge the financial support provided by the U.S. General Services Administration for the development of this document which is a regulatory update of the second edition. The Institute would also like to acknowledge the financial support of the following organizations and agencies in developing and disseminating the initial edition of this document:

American Consulting Engineers Council
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National Asbestos Council
National Association of Demolition Contractors
National Training Fund
Naval Facilities Engineering Command
Safe Buildings Alliance
Sheet Metal and Air Conditioning Contractors' National Assoc.
U.S. Environmental Protection Agency
Veterans Administration

In addition, the NIBS Board of Directors appreciates the leadership and expertise of Mr. Ralls C. Melotte, AIA, of Analytical Design Group, Inc., who served as chairman of the NIBS project committee, Casimer Szewczak of the Navy Environmental Health Center, who served as vice-chairman, and Robert J. DeFrank of the University of Maryland, who served as secretary. Also, the Institute wishes to acknowledge the excellent professional services provided by the Institute's contractor, Roger G. Morse, AIA. Most importantly, the Institute wishes to acknowledge and thank the members of the project committee for their exceptional and untiring efforts that were necessary to carry out this assignment.

The understanding of methods to deal with friable and nonfriable asbestos containing materials in buildings continues to evolve. Although many advancements have been made, improvements are still needed in many aspects of asbestos abatement and management practices. Procedures involving air monitoring and microscopy are sophisticated and involve highly specialized and skilled professionals. Standards and regulations for asbestos abatement continue to evolve and change.

This consensus document attempts to set forth the "state-of-the-art" of asbestos abatement and maintenance and repair in buildings today. Experts from a broad cross-section of the building, scientific, and medical communities helped shape the guide specifications as a resource document. It is intended that designers, environmental consultants, building owners, and contractors avail themselves of this reference tool and obtain the necessary expertise with which to make rational decisions concerning asbestos.

The Institute's Board of Directors recognizes and appreciates the extensive and highly professional effort and expertise that went into this document and is especially grateful to the members of the project steering committee who worked diligently to coordinate the development of the manual. A valuable public service has been performed by the Institute's Asbestos Project Committee and others who contributed to this superior effort.

Gerald H. Jones, P.E.
Chairman of the Board

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President

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Introduction

Introduction

This introduction is intended to provide information that will facilitate more effective use of the National Institute of Building Sciences' (NIBS) *Asbestos Abatement and Management in Buildings, Model Guide Specifications*. It has been prepared by a NIBS project committee following the rules of the NIBS consensus process. This process provides an opportunity for representatives from the full spectrum of the building community to participate in the development and approval of the document.

This introduction attempts to describe asbestos abatement projects and how they differ from normal construction or renovation projects. It explains asbestos abatement and management in the context of the content and organization of contract documents and the roles and relationships of the participants in the process. This introduction contains specific information on the use of the NIBS *Guide Specifications* for assembling a comprehensive set of contract documents for asbestos abatement in buildings. The information is expected to be helpful for building owners, designers, environmental consultants, legal counsel, public officials, contractors, or others in need of practical knowledge on this topic.

After carefully reading this introduction, the user will better understand:

- The design of an asbestos abatement project.
- Basic elements of the construction and operation of buildings, insofar as it affects the abatement of certain asbestos-containing building materials (ACBM).
- How to assemble and contract with a qualified design team.
- How to develop and coordinate contract documents.
- How to develop and coordinate a bidding package.
- How to negotiate and bid contracts.
- How to administer contracts.



1. Asbestos Abatement Projects

There are two major courses of action available to a building owner relative to asbestos-containing building materials (ACBM). The first course of action is to manage the asbestos-containing materials in place. The EPA Green Book “Managing Asbestos in Place, A Building Owner’s Guide to Operations and Maintenance Programs for Asbestos-Containing Materials” gives guidance on establishing operations and maintenance programs (O&M). A manual of O&M work practices is available from NIBS “Guidance Manual, Asbestos Operations and Maintenance Work Practices.” Both of these documents should be referred to by anyone developing an asbestos O&M program. The second course of action is to abate the asbestos. The abatement option frequently arises as the result of a renovation project or at the time of demolition. Abatement may involve removal, enclosure or encapsulation of the material, or a combination of these activities. Frequently, control programs for ACBM involve both management and abatement. The decision on the best course of action rests with the owner. This decision requires survey work and an assessment of alternatives. This introduction will not discuss these issues. The Environmental Protection Agency has issued a number of guidance documents on these topics (Appendix A). These should be referred to in determining a course of action and reaching decisions.

In making the decision, however, the owner should consider long-term needs, as well as, short-term responses. All buildings have finite life-cycles and, sooner or later, friable asbestos-containing materials must be removed. By regulation, friable ACBM generally must be removed prior to renovation or demolition. Asbestos management might be viewed as a strategic means of bridging to an opportune time (either practical or economic) where abatement becomes advisable.

This introduction focuses on abatement, because the *Model Guide Specifications* is primarily a tool used to develop abatement project specifications. Abatement should be viewed as one alternative. If a program of in-place management is to be used, some sections of the Guide Specification may be used as a guide in preparing a description of work procedures to be used in the management programs. The Guide Specifications may also be used to help develop contract documents for use in securing outside contractor services in support of a management program.

It is also important for the owner and designer to recognize that removal of certain materials, such as resilient floor covering, roofing and other non-friable materials, is treated differently under federal regulations.

BASIC ELEMENTS

There are at least three things necessary for a successful asbestos abatement project. These are design, contracting, and project monitoring. Asbestos abatement projects are likely to fail if any one of these three requirements is missing. Individuals providing these services need to have appropriate training and accreditation.

Design Team: Asbestos abatement projects must be **designed** rather than just allowed to happen. The importance of design can be illustrated by the following examples. If the design for isolating the work is inadequate, surrounding areas of the building may be contaminated. An asbestos abatement project requires the design of physical isolation of the project work area. This affects egress and hence life safety of occupants of the building. Virtually all states require that such decisions be made by a licensed design professional (architect or engineer). A pressure differential isolating the work area from the rest of the building must be engineered. In all but the most simple of situations this requires the application of mechanical engineering skills. In high-rise buildings or other more complicated situations, this requires sophisticated engineering and may involve modifications to existing ventilation equipment, including both return and supply systems. Replacement materials must meet building codes. If decontamination at the end of abatement is poorly performed, the space could be left in a state more contaminated than it was before work began.

When the project is finished, someone (the design team) must decide if the area meets contract requirements for reoccupancy. The reoccupancy standard should be one that the design team believes will meet all regulatory requirements and provide a safe environment for occupants. A carefully crafted contract is necessary to clearly delineate the responsibilities of all parties. To avoid as many problems as possible, the design team must have specialized experience and knowledge.

Contractor: The contractor performing the work must be proficient in and have any necessary licenses to work on the tasks required. The equipment and skills required for a successful abatement project are very specialized and many of the required functions offer little margin for error. A critical element in the success of any abatement project is the skill and experience of the workers and the contractor's staff supervising the set-up and execution of the work.

Project Monitor(s): Asbestos abatement projects should be monitored continuously during execution of the work by someone who is independent of the contractor, such as the designer or owner. Having this monitor independent of the contractor avoids any potential conflict of interest. In normal construction projects periodic inspections by the designer are usually sufficient to ensure that the project proceeds smoothly. This is not true of asbestos abatement projects. For example, sheet plastic barriers can fall or be cut, contaminated workers can wander out of the work area, or a HEPA fan (high

efficiency particulate air) unit can fail, allowing contamination of adjacent areas. These things can happen suddenly and without warning. Continuous on-site monitoring of the work, by the monitor, helps avoid such occurrences and ensures that corrective action is taken when they do happen. The monitor must be well-versed in asbestos abatement procedures. When mishaps occur it will often be the project monitor who communicates requirements of the designer to the contractor for emergency corrective procedures to be applied. The project monitor may also have the authority to stop work. When water is running from the decontamination unit and dripping to floors below there simply is not time to

consult the project designer at the office. Decisions must be immediate and appropriate to the circumstances. Stopping work by an entity other than the contractor is a complex issue. This is discussed in more detail later in this introduction. The project monitor also has the task of observing the work to determine if it is being performed in compliance with the contract documents. This part of the monitor's work may be defined by law or regulation in some states. Air monitoring is normally conducted on asbestos abatement projects. On small projects this work may be accomplished by the project monitor. On larger projects there may be a separate air monitor.

PARTICIPANTS IN THE CONSTRUCTION CONTRACT

There are four parties directly involved in the construction contract for an abatement project, and it is important to understand the role of each. The **building owner** initiates the project, pays the bills, and provides the information required by the other participants in the process. The **project designer** (design team) determines specifically what is needed to abate the asbestos, protect the building from contamination and clean the work area at the completion of abatement. A full-time on-site **project monitor** helps to ensure that the design is properly and continuously implemented (project monitoring is often provided by members of the design team). The **contractor** provides the labor, materials, and equipment necessary to complete the

work. Many of these are the traditional roles played by the participants in any construction project. Maintaining these roles for an asbestos abatement project will help to clarify responsibility and liability issues. Blurring the time-honored distinctions among these categories will complicate the issues of responsibility.

Owner: Owner indicates the party in a construction contract that owns the building (and the asbestos-containing materials in it) and pays the bills. The owner of a building containing asbestos will be beset with a variety of concerns about responsibility for the safety of people occupying, visiting, and maintaining the building. The owner is

well advised to consult an attorney in order to determine possible asbestos liabilities throughout the abatement process **and** after its completion. The owner's concerns may not go away with the hiring of a consultant. In any case, it is extremely important both that the quality of advice provided by consultants be very high and that the owner properly follow the advice.

Design Team: Because building owners usually lack sufficient technical knowledge and experience in asbestos work, they often engage expert consultants, who have such knowledge, to design and monitor the abatement project. There are two aspects to this work which must be accommodated:

Project Designer: The project designer determines, among other things, the scope of the work, parameters for isolating the work area, and procedures for clearing the area for re-occupancy at the end of the project. Bid documents describe this design in detail sufficient that a contractor can determine the quantity of labor, materials, and equipment necessary for the work. The project will frequently require a team of consultants working together, rather than a single entity. This is particularly true for large projects, or those involving other work such as renovation.

Project Monitor: The project monitor on an asbestos abatement project performs a function that is an extension of the traditional role of a project representative or clerk-of-the-works. This individual

observes all work to ensure that the contract requirements are being followed. The project monitor (or an air monitoring or laboratory sub-consultant) collects air samples to monitor airborne fiber levels inside and outside of the abatement work area. Typically, the project monitor reports to the project designer in the same manner that a clerk-of-the-works reports to an architect. Abatement projects normally proceed more smoothly if the designer and project monitor work as a team. The project monitor, as found on asbestos abatement projects, is not defined by any of the American Institute of Architects (AIA) or Engineers Joint Contract Documents Committee (EJCDC) documents, and as such must be defined in the Contract Documents (usually in the Supplementary General Conditions). The project monitor needs to be proficient in construction documents and asbestos abatement, as well as air monitoring.

Contractor: The contractor provides labor, materials, and equipment necessary to carry out the work indicated in the contract with the owner as defined by the contract documents prepared by the design team. Put another way, the scope of work is defined by the contract documents prepared by the design team. The contractor is responsible only for this defined scope of work. The designer is responsible for ensuring that the scope of work defined in the contract is accurate and complete. In some cases, it can be useful to take advantage of contractor expertise in methods, practices, and strategies for performing the work. This can be approached through participation by the contractor, construction management teaming, or value

engineering alternatives. Contractor input can also be obtained by including in the contract documents a mechanism whereby the contractor can submit alternative methods for consideration, and possible approval, by the design team. If the contractor is going to be asked to both

design **and** build, then his qualifications for design should be investigated with the same care as is described below for the design team. This practice raises conflict of interest concerns.



2. Choosing the Designer

DESIGNER

An asbestos abatement project is both a construction project (demolition and/or rehabilitation) and an environmental decontamination project. For this reason, the skills of several professional disciplines are required to accomplish a design.

The asbestos abatement designer has emerged as a distinct discipline in the last several years. This occurred in part because of professional liability insurance issues and the reluctance of the traditional design professions (architecture and engineering) to undertake a new and undefined risk without adequate insurance. Within the asbestos abatement industry the discipline of the asbestos abatement designer has been well defined. This has occurred in large part because of the accreditation and training requirements of the Asbestos Hazard Emergency Response Act (AHERA) that originally applied to abatement projects in schools, and now also apply to response actions involving friable materials in commercial and public buildings. If a project involves only asbestos abatement, an owner can usually find an asbestos abatement designer who can accept responsibility for all aspects of the project design and construction administration. However, the training and certification of asbestos abatement designers is limited to the removal of asbestos-containing materials. If the project involves other construction, additional professional skills and perhaps licensure are required. This is particularly true if life-safety issues (e.g. installation of new fireproofing, change of exit routing during abatement work, removal of materials providing fire separation) are

involved. In this instance licensure as an architect or engineer is required.

In the typical construction process the owner frequently looks for a single source to be responsible for all aspects of the project design and construction administration. Usually this would be an architect or engineer who would hire specialists as consultants, where needed. Projects that include asbestos abatement may follow this traditional pattern, but often may be handled separately from the rest of the construction process, with a separate design team, a separate specification and a separate contract for the actual abatement work. Whether asbestos abatement is separate or a part of the total construction package, frequently the demolition work necessary for the project will be included in the asbestos abatement portion. It is important that the design work of the abatement designer and the architect/engineer be coordinated. This can be accomplished by requiring coordination in the owner-consultant agreements for each party. Usually the architect/engineer is given the responsibility for overall project coordination.

Alternatively, the owner may put together a "design team" by contracting directly with a number of consultants. If this approach is followed, one consultant should be made responsible for coordination of the team. Whether the designer is an individual, a firm or a team of consultants, there are specific skills that are required for a successful project. The skills of an architect/engineer, abatement designer, industrial hygienist, project

monitor, and a testing laboratory must somehow be supplied. When choosing a designer or a design team the owner should make sure that all the necessary skills are provided, and that all licenses and certifications required by applicable laws and regulations are provided. The abatement designer does not need all of the skills in all areas of each discipline, but should be knowledgeable and experienced in those aspects that relate to the asbestos abatement project. Sometimes, a practitioner in one discipline (usually an architect, engineer, or certified industrial hygienist) will have learned a sufficient amount about the asbestos abatement aspects of other disciplines to be able to function as a stand alone abatement consultant. Knowledge in the following disciplines is required for a successful design.

Architect/Engineer: Most states require that any construction project that affects the life and safety of the occupants of a building must be designed by a registered architect or engineer. Fireproofing removal and replacement, changes in exiting during abatement work, and modifications of life safety (alarm) systems during abatement work are all examples of work that may require an architect's or engineer's license. Architects and engineers are licensed by the state, or states, in which they practice.

Preparation of the technical documents which describe the scope and requirements (drawings and specifications) of the construction project requires the expertise of an experienced registered architect or engineer. This member of the team ensures that the description of the work

provided by the abatement designer is complete and coordinated with other contract documents. This effort helps to ensure that the contract between the owner and contractor sets forth a clear scope of work that is fair to both owner and contractor. The architect/engineer also assists in acquiring bids from contractors, and evaluates qualifications of bidders. During construction work the architect/engineer is by virtue of his training and experience the appropriate entity to administer the contract for construction.

The OSHA construction standard (29 CFR 1926.1101) requires that a Certified Industrial Hygienist (CIH) or licensed Professional Engineer, who is also certified as a project designer, evaluate any control measures for Class I abatement work that are an alternative to those set forth in the regulation.

Industrial Hygienist (Environmental Consultant):

On an abatement design project, the discipline of industrial hygiene concerns itself specifically with worker protection, work area isolation, air monitoring, clearance air sampling, public health and occupant welfare. Worker protection is the contractor's responsibility on the project, but the industrial hygienist will bring knowledge in this issue to the design team. Activities required during asbestos abatement design that are within the discipline of industrial hygiene include: determination of appropriate work practices to be applied to the work, evaluation of engineering controls that are an intrinsic part of the project design, design of all sampling protocols including

selection of the appropriate analytical methods to be used for evaluating samples. Air sampling is carried out to help determine if the asbestos abatement work area is effectively isolated from the rest of the building, if the abatement work is complete, and if the abatement work area is safe to reoccupy. Sampling procedures for asbestos are continually evolving. Competent and experienced industrial hygienists should be aware of recent developments in these technologies. Sampling methods should always be reviewed with the owner and included in the design documents.

The OSHA construction standard (29 CFR 1926.1101) requires that a CIH or licensed Professional Engineer, who is also accredited as a project designer, evaluate any control measures for Class I abatement work that are an alternative to those set forth in the regulation. The construction standard also allows an accredited inspector or a CIH to evaluate samples used to rebut the designation of an installed material as a presumed asbestos-containing material (PACM). As of the date of writing, this OSHA requirement is potentially at odds with requirements of the EPA model accreditation program (MAP) which requires an accredited designer to evaluate control measures, and an accredited inspector to evaluate samples. EPA and OSHA are working to resolve this issue.

Industrial hygienists are certified by a professional body rather than being licensed by individual states. A Certified Industrial Hygienist is one who is certified in the practice of industrial hygiene by the American Board of Industrial Hygiene. Board certification indicates

professionalism and competency in industrial hygiene. Certification in comprehensive practice is most appropriate for asbestos abatement work, but specific experience in asbestos abatement is more important than the particular type of board certification.

Abatement Designer: The asbestos abatement designer must consider specific abatement procedures and isolation of the work area. Together with the industrial hygienist, the abatement designer must consider protection of workers and criteria for determining both when the work has been completed and when the work area can be re-occupied. This requires specialized knowledge and may require licensing or certification under state or local laws and regulations in addition to federal accreditation requirements.

The abatement design will normally be presented in the form of contract drawings and technical specifications, both of which are a part of the contract documents. The abatement designer either prepares the drawings and specifications or provides the design data and technical specification data to the architect/engineer who puts the information into the proper form for incorporation in the contract documents.

Abatement design is a relatively new discipline and is not uniformly defined or practiced in all parts of the country. The usual definition of an abatement designer in the industry is based on the requirements imposed by a state or locality. Frequently these requirements have resulted from the AHERA regulation for schools. The required training for an

abatement designer can vary from a four day course, to a pre-requisite of licensing as an architect, engineer, or certification as an industrial hygienist. Local practice may, or may not, require experience.

Asbestos Inspector / Management Planner: Federal regulations (AHERA and ASHARA) require that an accredited asbestos inspector determine the location and condition of asbestos-containing materials in schools and in public and commercial buildings. This determination may serve as the starting point for an abatement design. The management planner uses the inventory of asbestos-containing materials prepared by the inspector to determine an appropriate course of action relative to these materials. This determination could be the cause of an asbestos abatement project. Once a determination has been made a more detailed inspection is needed. An asbestos abatement project requires more information than is typically provided in an AHERA inspection and management plan report.

Project Monitor: During construction the project monitor advises the owner and architect/engineer of the effectiveness of the contractor's work practices. The project monitor continuously observes the contractor's work procedures, and monitors airborne fiber levels inside and outside the work area, to ensure that requirements of the contract documents are met. This monitoring is performed using sampling and analytical protocols set forth in the contract documents. These are in the contract documents for the contractors

information and are not a part of the contractor's work. Personal sampling required by OSHA is the contractor's responsibility and as such is not performed by the project monitor.

Laboratory: The analytical protocols to be used for analysis of air samples should be determined with the assistance of the laboratory that will be performing the analysis. Analytical procedures for asbestos are continually evolving. A laboratory should be aware of the latest developments. If Transmission Electron Microscopy (TEM) testing will be used for clearance, it is critical to determine that the laboratory will be able to supply the needed services within the schedule limitations of the project.

The laboratory is responsible for correctly analyzing samples and reporting accurate results to the industrial hygienist and/or abatement designer for interpretation. The laboratory can be a sub-consultant to the designer or can be contracted directly by the owner to furnish sampling analysis for the project monitor.

Uniformity of analysis is more assured if laboratories are accredited for the analysis they perform. OSHA requires quality assurance programs for laboratories involved in personal sampling. Some states have requirements and certifications programs for laboratories. A number of organizations operate accreditation programs. The major ones include:

- The National Institute of Standards and Technology (NIST) operates National Voluntary Laboratory Accreditation Programs (NVLAP) for

asbestos bulk sampling. Most laboratories providing this analysis are included in the program. To provide bulk sample analysis for schools under the AHERA regulation a laboratory must participate in this program. NIST also operates a NVLAP and Proficiency Analytical Testing (PAT) program for transmission electron microscopy (TEM).

Association (AIHA) operates a Proficiency Analytical Testing (PAT) program for laboratories providing phase contrast microscopy (PCM) air analysis. Most laboratories providing this type of analysis participate in the program. AIHA also has a laboratory accreditation program for PCM air analysis and maintains a registry of PCM analysts.

- The American Industrial Hygiene

OTHER ADVISORS

During the design of an abatement project issues frequently arise which require expertise beyond that found on the design team.

Attorney: Many issues relating to the contractual obligations and liability of the owner, the design team, and the contractor may arise during the course of an asbestos abatement project. The owner should have legal counsel who is independent from the other members of the design team. The owner's attorney should provide legal advice from the beginning of the project including review of the contractual arrangements with the design team. This attorney needs special skills and experience related to construction and environmental law.

Insurance Consultant: Both the availability and amount of insurance are important issues on asbestos abatement projects. Asbestos related insurance is a complex and rapidly changing field which will likely be beyond the expertise of the owner's normal insurance agent. Expert advice should be sought from an insurance consultant specializing in the asbestos field. Documents describing insurance requirements should be reviewed by both the owner's attorney and the insurance consultant. These insurance requirements should be set forth in the contract documents and made available to the contractors bidding on the project. During evaluation of contractor qualifications, copies of contractor insurance policies should be provided and reviewed.

REVIEW OF DESIGN TEAM QUALIFICATIONS

The qualifications of each member of the design team should be investigated by the

owner. If a single consultant is providing services in all areas, qualifications in each

area should be reviewed separately.

Review History of Experience:

This experience should be specific to the type of project involved. This includes similar asbestos-containing materials in similar conditions and locations in similar types of structures. This review of qualifications may not eliminate a consultant but may instead indicate an area where specific limitation may be imposed. For example, a specialized asbestos consultant on a school project may lack experience with and hence need assistance in dealing with the plan review requirements of the state agency governing the school. The experience of the specific individuals to be involved in the project as well as the firm's experience should be evaluated.

Check References: Several references should be checked to verify satisfactory performance on past projects. At least one reference from a similar project should be investigated. Inquiries should seek more than simple testimonials of good performance. A determination should be made as to whether design principles and procedures such as those discussed in this section and in applicable technical sections of the NIBS *Model Guide Specifications* were followed.

When checking references one should be aware that no single source is likely to give a complete portrayal of the work. The biases of each source of information should be understood and considered during the evaluation. The project monitor can be a useful source of information. This person was in the work area, but may know nothing about budget problems. A contractor may provide

useful information about past performance of designers relating to issues such as thoroughness and practicality. Building owners will know if projects have been executed in a timely fashion, within budget, and without complaints. However, they may know little about the actual work and the quality of performance.

Site Visits: Visits to job sites of active projects may be informative. This provides the opportunity to see how contract documents translate into a project, and how well project monitoring is being executed.

Interview: Potential consultants should be personally interviewed by the owner. This will enable the owner to make a determination about the depth of knowledge of the individuals involved. The actual individuals who will work on the project should be interviewed. Public anxiety can be a significant factor on asbestos abatement projects. The knowledge, experience, and public presentation skills of the consultant can be very important in resolving problems, whether actual or perceived.

Accreditation & Certification: Asbestos design consultants should have completed required training and be accredited and/or certified by applicable federal, state, or local agencies as required. AHERA accreditation is required to conform to minimum criteria in accordance with federal (US Environmental Protection Agency) regulations for schools.

which the project is located.

License: If the project involves work that invokes state requirements for an architectural or engineering license, a member of the design team must have a current license to practice in the state in

Complaints and Settlements: Check with consumer councils, state boards, Better Business Bureaus, etc., for complaints. Check for past litigation, jury awards, insurance payouts, etc.

OWNER-DESIGNER CONTRACT

Standard agreements for building construction projects such as AIA Document B-141 “Standard Form of Agreement Between Owner and Architect,” or Engineers Joint Contract Documents Committee (EJCDC) Form 1910-1 “Standard Form of Agreement Between Owner and Engineer” can be used as a starting point for the agreement between the Owner and the Designer. These documents set forth the duties and responsibilities of the architect/engineer and the owner in each phase of the project. Besides the obvious change in name from architect or engineer to designer, there are several crucial modifications that must be made to these standard agreements to suit the specific issues of an asbestos abatement project.

Project Phasing: The AIA document is based on the five traditional phases of a building design and construction project (Preliminary Design, Schematic Design, Design Development, Contract Documents, Construction). Abatement projects tend to concentrate more on the Contract Document and Construction phases of the work. The description of the phases of the work may need to be modified to suit. There may be

a single design phase. An abatement project designer has a more active role in construction than the typical architect or engineer.

Project Administrator (Project Monitor): The on-site Project Administrator normally works for the Designer, but through the owner-designer agreement becomes an agent for the owner at the job site. The normal role of the project administrator is described in AIA Document B352 “Duties, Responsibilities and Limitations of Authority of the Architect’s Project Representative.” This role is generally that of a passive observer reporting back to the architect. The Project Administrator on an asbestos abatement project typically has a much more proactive role. The following list some of the variations from normal construction practice. The standard forms for the owner-designer agreement will need to be changed to accommodate these variations. The contract documents that define the agreement between the owner and contractor will also have to reflect the relationships described below. Refer to the section in this introduction on “Contracting the Work.” The advice of legal counsel should be sought when

defining these relationships.

- The project administrator is sometimes given the authority to direct the contractor to change work practices. The conditions for this should be set forth in some detail in this agreement and in the supplementary conditions.
- The Project Administrator should be present at the project site whenever the Contractor is working. Several modifications to the general conditions are necessary to insure that this happens. The contractor should not be allowed to work unless the project administrator is on-site. The contractor also must give timely and sufficient notice to the designer and project administrator about when on-site activities will occur.
- The project administrators duties are usually limited to observing asbestos contamination-prevention procedures utilized by the contractor and directing changes necessary to protect the owner's interest.
- The project administrator is frequently authorized by the owner to direct the contractor to stop work immediately if the contractor's actions cause or make it probable that asbestos contamination of the project site will

occur. This substantially changes the roles and potential liabilities for the owner and designer. See the discussion below on this topic.

- The project administrator will secure air samples and analyze them as set forth in specification section 01013 "Summary of Work - Asbestos Abatement"
- Except for asbestos contamination, containment and prevention under specific circumstances to protect the owner's interest, the project administrator should not have control or charge of and should not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the work. The project administrator should not be responsible for the acts or omissions of the contractor, sub-contractors or any other persons performing any of the work, or for the failure of any of them to carry out the work in accordance with the contract documents.
- The project administrator needs to have access to the work at all times during the project.

STOP WORK

On asbestos abatement projects, the designer and on-site projects administrator are frequently given the authority to stop work. The standard forms for the Owner-Designer Agreement and the description of the duties, responsibilities and

limitation of authority of the project administrator must be modified to allow this. Allowing the designer and/or projects administrator to stop work is a major change in the normal assignment of responsibility and authority on a

construction project. This change should not be made without the advice of legal counsel.

There is a need for the authority to stop work. Problems such as a containment failure or supplied air system problems can create health and safety issues that require immediate correction. For this reason, on asbestos abatement projects, the on-site project administrator is frequently given the authority to stop work. In fact, many consultants and owners feel that this is the only way that the owner's interest, and the health and safety of the occupants of adjacent areas, can be protected.

There is a problem with granting stop work authority. The responsibilities and associated liabilities for the parties in the construction contract change from normal practice when the project administrator and designer are given the authority to stop work. The owner, designer, and project administrator may be accepting some of the contractor's responsibility for correctly executing the work. It is strongly recommended that advice of counsel be sought if this change is made.

In practice, the project administrator acts as an agent of the owner when issuing a stop work order (refer to the definition of project administrator in specification section 01091). The role of the project administrator on an asbestos abatement

project is similar to a project representative on a normal construction project, but is much more proactive. Traditionally, the owner's project representative is a relatively passive observer of the construction process, who is reporting back to the owner and designer. The project administrator on an asbestos abatement project is much more involved with the construction process. Unlike normal construction where deficiencies in the work can be evaluated and corrected at a later time, a contractor deficiency on an abatement project can create an immediate hazard to health and safety. A proactive project administrator changes the designer's and owner's liabilities relative to the project.

If the abatement contractor is a sub-contractor to a general contractor, OSHA requires that the general contractor assume supervisory authority over the abatement contractor. The contract document must be carefully drafted to avoid conflicts between contractual and regulatory requirements.

If the designer and/or on-site project administrator are given the authority to stop work the AIA and EJCDC standard forms for the General Conditions must be modified. Refer to the section in this introduction on "Contracting the Work" for a discussion on the needed modifications to these documents.



3. Design of the Asbestos Abatement Project

The design of an asbestos abatement project is involved with preventing contamination of the building and protecting the workers who are performing the abatement. The design of an abatement project includes: inspection to locate asbestos-containing material (ACM); physical isolation of the space; isolation of airborne contamination; isolation of waterborne contamination; protection of room surfaces; worker protection; regulations and standards; sampling and analysis; removal, enclosure, and encapsulation options; waste transport and disposal. The NIBS' guide specification does not cover replacement materials or build back situations. The project designer should refer to the American Institute of Architects (AIA) Masterspec™, Construction Sciences Research Foundation (CSRF) Spectext™ or other guide specification for this information.

Inspection to Locate ACM:

Before an abatement project starts it is necessary to locate the ACM which is to be abated. Usually the survey performed during development of an asbestos control program lacks the detail needed for a construction contract. Typically, a detailed documentation of existing conditions is necessary for the preparation of drawings describing the work. The type and quantity of ACM are important determinants of the worker protection, work procedures and engineering controls necessary to safely complete the work. The work procedures and controls, in

conjunction with material quantities, will determine the scope of work and the total cost of the project. The contract documents should include information on material type and quantity so that the workers involved in the abatement can be fully informed about the material and its characteristics and can be adequately trained and protected. The November 1990 revision to the NESHAP regulation (40 CFR 61 A and M) makes this inspection the responsibility of the owner. Additionally, the ASHARA of 1990 requires that the inspector be certified according to the requirements of the AHERA regulation. OSHA (under 29 CFR 1926.1101) also requires that the building owner identify the presence, location and quantity of ACM or presumed ACM (PACM) at any work site before any work begins that could disturb asbestos. OSHA also requires that thermal system insulation and surfacing materials found in buildings constructed no later than 1980, and resilient flooring installed no later than 1980, be presumed to contain asbestos unless sampling is performed to rebut this presumption. An AHERA inspection or sampling can be used to rebut the PACM presumption (1926.1101 (k)(5)(ii)).

Defining Scope of the Work:

Field investigation to determine both the primary site of the work and locations which may be ancillary are necessary in order to determine precisely what must be done. A project may, for example, appear

to simply consist of removal of fireproofing from beams. Fireproofing overspray on the deck above and debris on top of ceilings below may extend the work required, however, but not be immediately apparent. The designer is responsible to the owner to use reasonable care in locating and describing the entire scope of work.

Physical Isolation of the Work

Area: An asbestos abatement work area, like any other construction site, is unsafe for untrained and unprotected individuals. The first step in an abatement project is to physically isolate the work area so that only properly trained and equipped workers can gain access. Doors to the area should be locked, temporary partitions constructed, or other measures taken as necessary to secure the area. The paragraphs entitled "Control Access," in Section 01526 are used to specify the physical isolation of the Work Area.

Isolation of Airborne

Contamination: Asbestos abatement operations that disturb ACBM, will contaminate the work area with airborne asbestos fibers. The remainder of the building, and the outside, must be protected from this contamination. This is accomplished by sealing all points of entrance to the work area (including mechanical systems), and maintaining the work area at an air pressure lower than that of surrounding areas (above and below as well as adjacent to).

- **Critical Barriers:** Provide physical isolation of the work area from other portions of the building. Critical Barriers as described in Section 01526

(Temporary Enclosures) are used for this purpose (See drawing of critical barriers). Small openings such as cracks at doors and windows may be sealed with duct tape. Larger openings are sealed with sheet plastic which is then sealed at its perimeter with duct tape. In some instances a critical barrier may be an entire temporary wall fabricated from sheet plastic or other rigid materials. Polyurethane foam caulks are useful, especially for sealing around duct and pipe penetrations through walls and floors.

- **HVAC Shutdown:** The HVAC exhaust and ventilation units serving the work area must be shut down and associated duct work sealed off. The sub-paragraph "Disable ventilation systems," of "Part 3, General," of section 01526 is used to specify this. Sealing of duct work is covered by the paragraphs on "Critical Barriers." These sections may have to be augmented by drawings and additional specification language for special situations such as high pressure systems, or systems that cannot be shut down. During project design, HVAC units and ductwork should be evaluated to see if decontamination will be necessary before start-up following abatement.
- **Pressure Differential:** A pressure differential is created so that the air pressure in the work area is lower than that of surrounding areas. This is accomplished by exhausting air from the work area through High-Efficiency Particulate Air (HEPA) filters which remove asbestos fibers

from the air. Sheet plastic barriers (critical barriers) alone are inadequate to prevent the spread of airborne asbestos fibers beyond the work area. When the work area is maintained at an air pressure lower than the surrounding areas, any leakage of air will be from outside to inside the work area. Contaminated air is effectively prevented from escaping the work area. Portable HEPA-filtered fan units are commercially available to create this pressure differential. Section 01531 (Temporary Pressure Differential and Air Circulation System) discusses in some detail the methods of setting up pressure differential isolation of a work area.

Isolation of Water Borne

Contamination: Water with a wetting agent added (amended water) or removal encapsulant is used to wet asbestos-containing materials before removal as an engineering control. Everything being removed from the work area for disposal is decontaminated by washing. This includes non-asbestos materials and bags and containers for asbestos waste. Work areas are misted with amended water to reduce airborne fiber levels, and workers shower when leaving the work area. Water is used for pre and post abatement cleanup. This extensive use of water on an asbestos abatement project creates considerable possibility for contamination of other parts of the building by contaminated water. Where a removal encapsulant is used for wetting of materials the problem is somewhat ameliorated because less liquid is typically used.

Floor Leakage: Sheet plastic or a strippable coating should be installed on floors to prevent water from leaking through (See Section 01526 - Temporary Enclosures). Normally two layers of 6 mil polyethylene or one coating of strippable coating are used.

Every effort should be made to create a watertight membrane to prevent leakage and the spread of contamination. When sheet plastic is used, each layer should be installed independently with seams offset by at least 6 feet or installed at right angles and run up the walls about 12". Preferably seams should be double sealed with spray glue and duct tape. Colored chalk can be put between layers as a marker to locate leaks. Care should be used in selecting a chalk to ensure that it will not stain floor finishes. A large area of floor can be affected by a single small leak. It is prudent to always use transparent plastic on floors so that the extent of water spread can be detected.

The removal of metal ceiling and wall materials, piping, and ductwork can puncture plastic or create minute pinholes. Where floor finishes can be damaged, stringent measures such as replacement of the floor plastic after the initial non-asbestos removal work may be advisable. In critical installations, use of a high performance waterproof membrane such as a rubber roof membrane or reinforced poly-sheets may be required. Plywood or flakeboard sheets may be used over carpeting as an additional protection.

Sub-floor raceway systems for distribution of power and communications cabling are common in multi-story office building construction. During abatement, openings

to the raceway system should be individually sealed before the floor plastic or strippable coating is installed, and provisions for decontamination considered if necessary. Capability of rapid power shutdown should be analyzed.

Strippable coatings which spray on to form a continuous, non-slip membrane adhered to the floor solve many of the leaking problems that plague sheet plastic. Water cannot travel under the adhered membrane and damage from demolition work can be easily repaired by applying another coat over the original. Strippable coatings are normally less combustible than sheet plastic. When peeled up, they normally leave the floor in a clean state, eliminating two steps in the decontamination process. However, this cleaning can be so thorough as to damage some substrates. Strippable coatings are not appropriate over all substrates (obviously not over carpeting). During installation strippable coatings give off a mild ammonia odor. Use caution and consult manufacturers for instructions on proper use.

In multi-story projects that are preceding from the top down, disruption to building operations from water leakage can be minimized by creating a buffer floor below the work area. This may be a floor that has been evacuated and is scheduled next for abatement. The ideal buffer floor would be unoccupied, have sheet plastic on floors and walls, be equipped with critical barriers, have the HVAC shut down, power turned off, and primary barriers installed. Leakage discovered on the buffer floor should trigger correction of the leak, and clean up procedures. Repeated leakage problems should trigger

a general review of the contractor's abatement procedures and the training of workers. If a buffer floor is not available, procedures for clean up and decontamination of spills should be specified (See Section 01712 - Cleaning & Decontamination Procedures).

Waste Water: Waste water from either personnel or equipment decontamination units typically contains a considerable amount of debris. If flushed down the building sewer, this material can collect in traps, settle in lines, and present a future contamination problem. In addition, such disposal may be considered a violation of state or local clean water regulations. This problem can be avoided by properly filtering the water. Filtering can be accomplished with commercially available water filters. A coarse filter (20 micron) should precede the final filter (5 micron) (See Section 01563 - Decontamination Units). Check state and local regulations; in some filtering is required, in others it is prohibited. The filtered water can then be disposed of down a building sanitary (not storm) sewer. Grey water (i.e., wash water from showers) should not be used for wetting ACM. This would solve a disposal problem, but is a violation of most sanitary codes. The soaps used during showering may create suds and cause problems with spray equipment. Spraying water that may be contaminated with asbestos into the air is also not considered good practice.

Protection of Room Surfaces: Asbestos abatement projects, particularly removal projects, develop a considerable amount of contamination inside the work area. This contamination can be in the

form of airborne fibers, dust, debris, wet slurry, or a combination of these forms of contamination. Also, the environmental conditions (such as high humidity and water) inside the work area can be detrimental to interior finishes. Accordingly, the surfaces of the room need to be protected from damage or contamination.

Primary Barrier: A sheet plastic covering or strippable coating of walls and floors (See Section 01526 - Temporary Enclosures). If sheet plastic is used, the floor plastic is installed first and extended up the walls. Wall plastic is installed shingle fashion to overlap the portion of the floor plastic extending up the walls. This ensures that water running down the wall will run out on top of the floor plastic. Wall plastic should be mechanically supported rather than depending upon duct tape or spray glue for support (unless a workable and tested taping system is known to the designer). Tape and spray glue are usually used to provide a seal to the wall. Damage from tape and spray glue is frequently an issue on abatement projects. The designer should clearly define the responsibility for and method of repair of this damage.

If strippable coating is to be used it should be installed as a continuous membrane over floor and walls. Finishes on both should be tested to determine if damage may occur during removal of the coating. This should be done during design of the project and not left to testing by the contractor at the start of work. Manufacturers instructions should be carefully followed on the installation and stripping of coating material.

Secondary Layer (Drop Cloth Layer):

At the start of each work day, a properly secured layer of sheet plastic can be put down as a drop cloth. Cleaning and removing the drop cloth layer at the end of the work day prevents remaining smears of debris from drying out overnight and elevating airborne fiber levels; it also makes later cleanup easier. The drop cloth layer should not be loose. A loose sheet of plastic creates a slipping hazard and makes cleanup more difficult by trapping water and debris.

Where floor surfaces would be damaged by scaffold rollers, ladders, or other equipment, heavy cardboard, plywood, or other suitable materials may be necessary for additional protection between the primary barrier and the secondary layer. This is generally a good idea if carpeting is to remain in place.

The scope of work should clearly describe the contractor's responsibility for damage to floors, finishes, and other building components. Such damage can be left as the contractor's sole responsibility or repaired as an extra (change order) to the work. The designer should consult with the owner and the contract documents should clearly allocate the cost of repairs which may be necessary. Unavoidable damage from the mechanical fastening of barriers as well as accidental damage should be addressed. Patching and repairing can add significantly to the cost of the work. Difficulties in matching colors or textures of finishes can extend repair work to undamaged areas. Unless specifically advised otherwise in the contract documents, the careful bidder will assume that all finishes must be replaced and price the work accordingly.

The contractor is in large measure required to use protective measures designed by the owner's representative. The contractor should be asked to verify the adequacy of these measures. If the contractor is made absolutely responsible for all damage, the owner can expect bid prices to be increased by approximately the replacement value of all the involved finishes.

Where abatement work is followed by renovation, repair may not be a major issue. Renovation work will most likely be done under a contract separate for the abatement work.

Worker Protection: The workers involved in asbestos abatement work need to be protected from asbestos that is released into the air as the result of abatement or O&M activities, as well as from the hazards of normal construction. Normal construction practice as well as regulation make worker protection the responsibility of the Contractor, as the entity employing the workers. The designer of an asbestos abatement project or O&M program should be careful to insure that the contract documents clearly leave the responsibility for worker safety with the Contractor. If this responsibility is partially or completely transferred to the Owner or Designer all parties will be acting in unfamiliar roles. This exposes the workers to greater risk, and the Owner and Designer to unaccustomed liabilities. The OSHA construction standard requires a general contractor to assume supervisory responsibility for asbestos abatement sub-contractors, 29CFR1926.1101(d)(5). The contract documents need to be carefully written to assure regulatory as well as

contractual compliance.

Worker protection is governed primarily by the OSHA standards described in the following pages. However, a number of other federal occupational and environmental regulations, standards and guidelines also apply to these operations. See Appendix A for a more detailed description of the applicable OSHA, EPA and DOT regulations. In addition, state and local regulations, which may be more stringent than the federal requirements, may also apply.

OSHA has recently revised three specific standards governing exposure to asbestos in the workplace; the construction standard, the shipyard standard, and the general industry standard, and has issued a Compliance Directive (CPL 2-2.63, November 3, 1995) for use by its staff in enforcing the revised standards. The designer should become familiar with these documents.

In addition to these, there are standards of more general applicability on construction worksites, such as OSHA's Hazard Communication standard and the construction workplace standards found under 29 CFR 1926.

Most activities within the scope of this manual come under the asbestos in construction standard, 29 CFR 1926.1101 "Occupational Exposure to Asbestos." This regulation governs all employers involved in asbestos abatement work in the private sector and federal government. All employees involved in construction activities are covered by the construction standard regardless of the primary activity of the employer.

OSHA has significantly altered the way it regulates asbestos exposures in construction. Worker protection is now geared to the type (or Class) of work being performed and certain protections are required regardless of measured exposure levels, including, in many instances, respiratory protection.

The OSHA construction standard establishes four categories of asbestos work.

Class I asbestos work means activities involving the removal of thermal system insulation (TSI) and surfacing asbestos-containing material (ACM) or presumed asbestos-containing material (PACM). (In general this involves work on friable materials.)

Class II asbestos work means activities involving the removal of asbestos-containing material (ACM) that is not TSI or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics. (In general, this involves work on non-friable materials; more stringent controls are required if the material is friable (“non-intact”), or becomes friable during the course of the work.)

Class III asbestos work means repair and maintenance operations where ACM, including TSI and surfacing ACM and PACM may be disturbed. (In general this is O&M work that generates no more than a single disposal bag of waste.)

Class IV asbestos work means maintenance and custodial activities

during which employees contact, but do not disturb, ACM or PACM, and activities to clean up dust, waste, and debris resulting from Class I, II, and III activities. Workers should wear respirators if cleaning up a regulated area where respirators are required. Awareness training is required at a minimum. In practice, a worker cleaning up in an asbestos area should have the same training as other workers in the area. Note: as of the date this was written, there is an “issue” between present EPA and OSHA regulations and interpretations. EPA does not consider the 2-hour “awareness” training of OSHA’s Class IV workers (similar to EPA’s custodial/maintenance workers in schools) to be appropriate or adequate for allowing those individuals to, “clean up waste, dust, and debris resulting from Class I, II and III activities.” For Class I and II work of this type, EPA contends that abatement worker training and accreditation is required, and a 14-16 hour O&M type of training is required for Class III work. OSHA and EPA are working to resolve this apparent discrepancy their regulations.

Further details on the OSHA Construction Standard are provided in Appendix A “Federal Regulations.” Worker protection is the contractor’s responsibility. However, certain procedures specified to further the owner’s interests, will also protect workers. The contract documents should make it clear that engineering controls required in the contract for the owner’s purposes, are not intended to accomplish the contractor’s obligations under OSHA. The contractor may have to exceed requirements of the contract documents to comply with OSHA

requirements.

Engineering Controls and Work

Practices: The contractor is responsible for establishing engineering controls and work practices such as wetting, ventilation of the work area, enclosure, use of HEPA vacuums, glove bags, etc.. However, several sections of the *Model Guide Specifications* impose requirements, for owner purposes that also accomplish engineering control. For example, HEPA-filtered fan units used to create pressure differentials which isolate work areas can also provide general ventilation within work areas (Section 01513 Temporary Pressure Differential & Air Circulation System). When properly configured, the same units can be used to provide local exhaust ventilation from the work area. Negative pressure enclosures, ventilation, and local exhaust are all engineering controls required to protect asbestos abatement workers. These ventilation strategies reduce airborne fiber counts, humidity, and sometimes temperature as well. Specification section 02081 of this document requires wetting of ACM to ensure that the owner complies with the NESHAP regulation. This wetting method is also a common work procedure used by contractors to maintain fiber concentration levels below the PEL.

Respiratory Protection: Respirators are required during: all Class I work, Class II work where ACM is not removed in a substantially intact state, Class II and III work performed without wet methods, Class II and III work where there is no negative exposure assessment, Class III work where TSI or surfacing material is being disturbed, Class IV work where other employees are required to wear

respirators, all work where the PEL or EL is exceeded, and in emergencies. Refer to the Evaluation for Section 01562 “Respiratory Protection” and Appendix A for more information on respiratory protection. There are several exceptions. A respirator is not required for removal of ACM from sloped roofs when wet methods are not used, if a negative exposure assessment has been made and the ACM is removed in an intact state. OSHA does not require respirator use during resilient flooring removal if a negative exposure assessment has been made based on: use of work practices such as those contained in specification section 02085 (note that these are wet methods), proper training of workers, and the resilient flooring is intact and is likely to remain intact throughout the removal process.

Protective Clothing: The employer is responsible for providing protective clothing such as coveralls or similar whole body clothing, head coverings, gloves, and foot coverings for all workers exposed to levels exceeding the PEL or the Excursion Limit, and for Class I work involving over 25 linear of 10 square feet of TSI or surfacing material (29 CFR 1926.1101(I)). The employer is also responsible for: any laundering required, inspecting protective clothing once a day, and immediately repairing or replacing work suits when rips or tears are detected. The owner may want to specify protective clothing, even if not required by the regulations, to assure that asbestos is not carried to other areas of the work site or to the worker’s home.

Decontamination Units: The personnel decontamination unit is the location at which a contaminated worker being

protected by a respirator is transferred to a clean area where a respirator is not needed. This conversion must take place without the worker ever breathing asbestos fibers. The basic element of any decontamination unit is a shower. This shower should provide reasonable privacy, be adequately heated, provide hot and cold water adjustable by the worker, have soap and towels, and have adequate and reliable drainage. There should be a noticeable motion of air from the clean room toward the work area. It is preferable for the air to move evenly through the entire shower; but it is essential that it move through the worker's breathing zone.

An equipment decontamination unit is not required by OSHA, but is by many local regulations. Bagged or drummed waste and large equipment should be taken out of the work area through a decontamination facility separate from the one used for personnel. Decontamination of bagged waste and equipment requires different procedures than decontamination of people does. Items of equipment are usually wet wiped several times. Sometimes items are passed through a portal into a clean bag that has never been in a work area, then sealed and removed for disposal. If there is an accident, such as a bag or drum breaking in the equipment decontamination unit, there is still a safe means of egress for workers.

Decontamination units are frequently a weak link in the work area isolation chain. They can easily become contaminated by the gradual tracking of asbestos-containing debris through the unit. This endangers workers and may contaminate the building. For these reasons careful design, construction, operation and

maintenance of the decontamination unit is essential. Section 01563 - Decontamination Units, describes the construction and operation of the decontamination units.

Communication of Hazard: Workers who must perform any tasks that could disturb asbestos need to be informed about the location of ACM in the work area, and informed about work practices acceptable to the building owner to prevent asbestos disturbance.

Training: The OSHA asbestos regulation requires that all employees (including competent persons) who perform Class I, II, III or IV work be trained. The EPA Asbestos MAP, which now applies to workers in public and commercial buildings, requires more training in certain instances (e.g., in Class II aggressive removal activity), than the OSHA regulation does. Training is the employer's responsibility, and must be provided at the employer's expense, prior to assignment, and at least annually thereafter.

Housekeeping: Housekeeping on abatement projects refers to clean-up of waste and debris. These must be promptly cleaned up so that they do not dry out and release asbestos into the air. Waste and debris are not to be dry swept, and only HEPA vacuums are to be used for vacuuming.

Medical Surveillance: The employer must make medical examinations available to all workers who will perform Class I, II or III work for more than a combined total of 30 days (for an hour or more per day) per year, who are exposed above the

permissible exposure limit (PEL), or who wear any type of respirator. Note that workers who are assigned to use respirators must have a medical evaluation **before** using a negative pressure respirator.

Record Keeping: The employer must maintain records documenting compliance with the OSHA standard and be able to make these records available upon demand.

Competent Person: OSHA requires that there be an individual on the job who has the training and experience necessary to make judgements about worker safety and health relative to asbestos and other construction work site hazards.

Electrical Lockout: Asbestos abatement projects involve the use of considerable amounts of water and as such are wet work areas. For this reason it is very important that workers be protected from shock hazard. All electrical circuits in the work area should be de-energized and locked out to prevent accidental re-activation. Temporary power should be installed as a part of work area preparation. All power including that for lighting should come from a panel outside of the work area and must be protected with ground fault circuit interrupters. Electrical lockout and temporary power are covered in Section 01503 "Construction Facilities and Temporary Controls - Asbestos Abatement."

Regulations and Standards:

Applicable statutes, regulations, and standards need to be made a part of the contract for the work. It is not sufficient to casually refer to, "compliance with all

applicable regulations," or assume they will apply because they are issued or adopted by the local, state or federal government. The General Condition require the contractor to conform to applicable regulations. In addition to this, many environmental consultants list and adopting asbestos related regulations by reference. Frequently these regulations have very specific requirements for conduct of the work. Adopting these regulations as a part of the contract means that non-compliance with an adopted regulation is also a contract violation. This gives the owner the right to require the contractor to comply (See Section 01092 - Codes & Regulations - Asbestos Abatement). Caution should be used if a list of regulations is made a part of the specifications. By listing codes and regulations, the assumption is that only those listed apply, and those not listed are not pertinent. The design professional runs the risk of inadvertently omitting a critical regulation which will then lead to further problems.

Standards address issues such as respiratory protection (American National Standards Institute (ANSI). Practices for Respiratory Protection. Publication Z88.2-80), operation of HEPA-filtered devices such as negative air machines and vacuums (ANSI. Fundamentals Governing the Design and Operation of Local Exhaust Systems. Publication Z9.2-79), and other issues critical to the success of an asbestos abatement project. Typically, standards are not binding on the contractor unless made a part of the contract (usually by adopting them by reference in the specifications), or adopted by reference to an adopted statute or regulation.

The designer should be cautious in adopting regulations or standards that do not apply to a project (e.g. adopting the AHERA regulation for a non-school project). It is far preferable to include the desirable portions of the regulation as specification requirements, than to adopt the entire regulation.

Section 01092 - "Codes, Regulations, and Standards - Asbestos Abatement," is used to include compliance with the appropriate regulation and standards as a contract requirement. This section is consistent with other parts of the *Model Guide Specifications* for federal regulations and national standards. Care must be taken to make sure that the requirements of state and local regulations adopted are consistent with other requirements of the contract.

The design of an asbestos abatement project should meet the requirements of applicable regulations. For example, a direct inter-relationship exists between the engineering controls required by OSHA and the work area isolation measures that are a part of the project design. The primary engineering controls on an asbestos abatement project are the pressure differential and ventilation system that also provides work area isolation. The designer of a project may also need to interpret regulations to determine those that apply.

Resilient Flooring is treated differently. Removal of resilient flooring is treated differently by the OSHA regulations. Refer to the Evaluation to Section 02085 and Appendix A for more information.

Testing: Both the owner and

contractor will be conducting air monitoring during the abatement project.

Owner: Often owners require periodic sampling and analysis of the air both inside and outside work areas, to ensure that building spaces outside the work area remain uncontaminated (See Section 01013 "Summary of Work - Asbestos Abatement." This air sampling is unrelated to the personal sampling conducted by the contractor for OSHA compliance, and will normally be performed differently. Section 01013 sets forth the kinds of air testing the owner will be performing and the analytical methods to be used. Action levels for stop of work are also set.

Contractor: The contractor is required by OSHA to sample the air in the breathing zone of workers in order to ensure the adequacy of respiratory protection provided to them. Personal air samples are taken in the worker's breathing zone, which is 6"-8" from the respirator. Secure the cassette on the collar or lapel of the employee.

The NIBS specification sections are written so as not to abridge the contractor's responsibility. The owner's only participation in this regulatory requirement is that the expense for it will have been included in the contractor's bid price.

Abatement: Abatement can consist of removal, enclosure, encapsulation or management in place.

Wet Removal: Asbestos-containing material to be removed is saturated with

amended water or a removal encapsulant and removed from its substrate. Any residue left on the substrate is removed with wet wiping and stiff bristled brushes (See Section 02081 - Removal of Asbestos-Containing Materials and Section 02082 - Removal of Asbestos Contaminated Soil). High pressure water jets have been used for ACM removal. This has proved to be most useful on the removal of residue. The use of high pressure water jets for gross material removal has frequently led to problems such as widely scattered debris and leaking through containment barriers.

Dry Removal: In locations where there is active electrical equipment or hot pipes it may be necessary to perform dry removal of asbestos-containing materials. This requires specific NESHAP notification with prior approval from the US EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) coordinator. Dry removal normally is accomplished with HEPA-filtered vacuum cleaners, careful (non-disruptive) work procedures, and augmented local ventilation. Dry removal normally requires special care in work area isolation and a higher level of respiratory protection.

Encapsulation: There are two types of encapsulation. Penetrating encapsulants bind the constituents of an asbestos-containing material together and to their substrate. Bridging encapsulants coat ACM with either a tough and flexible coating or with a hard coating (See Section 09805 - Encapsulation of Asbestos-Containing Materials). This process is intended to prevent or greatly restrict fiber release.

A particularly crucial encapsulation issue is its use in conjunction with fireproofing systems which are tested and classified for fire resistance by Underwriters Laboratories (UL). Spray fireproofing systems are generally of this type. UL considers binders and primers as part of the system that must be tested. If an unclassified substance is used to encapsulate an existing fireproofing system or is used as a post-abatement lock-down, this could nullify the UL rating for the fireproofing. Some encapsulant manufacturers have tested their products with some fireproofing materials. The designer needs to be careful that the specified materials have a UL classification for the specific application and with the specific fire proofing materials and arrangements. Encapsulant submittals should also be carefully checked for conformance, and the application of the materials should be observed to verify that the proper, compatible and UL tested materials are applied. The encapsulation of spray-applied surfacing ACM may be illegal in some jurisdictions.

Enclosure: Enclosing an asbestos-containing installation can be accomplished by sealing it behind a permanently constructed airtight barrier. This barrier can be constructed of gypsum drywall, tongue and groove plywood, concrete, masonry, metal or other materials. The construction is made as airtight as possible. The use of enclosure is most appropriate if there is no need to obtain access into the enclosed area. **Model Guide Specifications** provide guidance on the use of gypsum drywall systems for such an enclosure (See Section 09251 - Gypsum Drywall -

Asbestos Enclosures).

Mixed Waste: The proper handling and disposal of hazardous materials frequently becomes an issue on asbestos abatement projects. PCB's in light ballasts, mercury in light tubes and thermostats, and lead in paint are routinely found on asbestos abatement projects. Deliberately mixing potentially hazardous waste streams must be avoided to comply with RCRA prohibitions against on-site treatment (i.e. dilution) [40 CFR 261.3(a)(iii-iv) and 40 CFR 268.3] and to prevent contamination of non-hazardous materials. This means that on large projects these materials must be individually collected, stored and disposed.

PCBs are regulated by TSCA and require disposal at approved disposal sites that are licensed to accept PCB containing waste. Materials suspected of being contaminated with PCB's should be tested to determine the concentration, unless the owner already knows that it is contaminated with PCBs. Materials with PCB concentrations of 50 parts per million (PPM) or greater must be managed according to TSCA requirements. Concentrations of 500 PPM or greater require disposal by incineration at a facility licensed to accept PCB waste. Concentrations of 50 PPM or greater may also be incinerated to minimize disposal liabilities.

Disposal of mercury waste must be performed according the RCRA regulations if the generator of the waste is a regulated generator of hazardous waste.

If the generator of the mercury containing waste is an exempted small quantity generator and the amount of mercury to be disposed does not exceed the threshold for the exempted small quantity generator status, the waste does not have to be disposed according to RCRA. The small generator quantity exemption is generation of less than 100 Kg/month for full exemption and less than 1,000 kg/month for regulated small quantity exemption. However, disposal of mercury at any quantity should be at a licensed mercury waste handler to minimize long term disposal liability. The best method to dispose of mercury is through recycling/re-processing of the material.

Under current regulation, the building owner is the generator of any hazardous waste removed from the building. The owner can not pass the RCRA/TSCA generator responsibility to the contractor performing the work in the building. The owner is responsible for assuring that the waste is disposed according to the regulations and must initiate all appropriate and required documentation such as waste manifests.

During a project where hazardous material are involved. Each material must be collected, stored and disposed of separately. Section 02086 Hazardous Waste Management provides guidance for developing specifications for handling hazardous waste on asbestos abatement projects. An expert in hazardous waste should be consulted for projects involving a large quantity of waste or where hazardous materials are already mixed in place (e.g. lead-based paint on an asbestos-containing substrate).

Where possible it is preferable to recycle hazardous materials. For example, the raw materials in fluorescent light tubes and lead based paint are frequently recovered by recycling plants.

Disposal: Section 02084 - Disposal of Asbestos-Containing Waste Material, is used to specify the appropriate methods of handling, containing, labeling, transporting and disposing of waste in accordance with Department Of Transportation and EPA NESHAP regulations. DOT recently revised its hazardous material regulations (49 CFR 171-180). With certain significant exceptions, packaging of ACM must meet general Hazardous Materials Regulations (HMR) requirements and be protective, marked, placarded, and labeled.

Packages of ACM must generally have a DOT class 9 (miscellaneous hazardous materials) label. They must be marked as follows: "RQ" (for 1 pound (0.454 kg) or more of friable ACM), "waste" or the EPA hazardous waste marking (for waste), the shipping name, the United Nations identification number, and the consignee or consignor's name and address (in most cases). After October 1, 1994, bulk packaging, freight containers and transport vehicles will generally be required to have class 9 placards. Crocidolite ("blue"), and amosite ("brown") asbestos, except for DOT "small quantity" shipments and non-friable ACM in good condition, are forbidden on aircraft and passenger-carrying railcars. Friable chrysotile, actinolite, anthophyllite and tremolite ("white") asbestos are limited to 440 pound (200 kg) shipments by the above

modes. Shipping papers must generally display the following: "RQ" (for 1 pound (0.454 kg) or more of friable ACM); "waste" (if applicable); the proper DOT shipping name and accompanying United Nations identification number ("white" - (UN2590), "blue" and/or "brown" asbestos - (UN2212); "mixture" if asbestos used with non-asbestos materials); 9 (for DOT class 9); the packing group (III, II or I, for white, blue, or brown, respectively); Ltd Qty (for certain limited quantity shipments); and the total quantity (typically by weight). When two or more DOT asbestos categories are mixed in a shipment, each must be shown on the shipping papers.

Some significant limitations and exceptions to the DOT regulations deserve note. A shipment of samples over 1 ounce (30 grams) each is subject to the regulations; but a "small quantity" shipment of smaller samples may be exempt if certain conditions relating to inner and outer packaging, cushioning, package marking and total weight are met. A "limited quantity" shipment is exempt from marking if less than 66 pounds (30 kg) with strong outer packaging containing inner packaging no heavier than 11 pounds (5 kg) each; and is exempt from labeling and placarding when not being shipped by air. There are specific requirements for packaging of ACM, but DOT performance-oriented packaging specifications do not apply.

The DOT regulations do not cover asbestos immersed or fixed in binder materials such as cement, plastic, asphalt, resins or mineral ore (i.e., nonfriable ACM that has not been crumbled, pulverized, or reduced to powder); manufactured

products containing asbestos (e.g., pipe gaskets); or shipments of less than 1 pound of friable ACM.

The EPA NESHAP requires the following: vehicles transporting asbestos-containing waste must be marked with asbestos danger signs during both loading and unloading; a waste shipment record for each shipment of ACM waste; a copy of the shipment record, signed by the transporter, must be given to the building owner or operator when the waste leaves the building site; and a copy of the shipment record, signed by the disposal site, must be received by the EPA within 45 days of shipment.

Revisions to the NESHAP regulation were published in the November 20, 1990 Federal Register. These revisions define two classes of non-friable ACM.

Category I non-friable ACM include packings, gaskets, resilient floor covering, and asphaltic roofing products that contain more than 1 percent asbestos. All other non-friable materials that contain more than 1 percent asbestos are categorized as Category II. Category I non-friable materials are non-regulated unless they are in poor condition and have been made friable or have been or will be subject to sanding, grinding, cutting (sawing not slicing), or abrading. Category I non-friable materials do not have to be removed from a structure prior to demolition (unless demolition is by burning, for which all ACM must be removed) or renovation and do not have to be disposed of as ACM unless they are in poor condition or are made friable during the work. Category II non-friable materials are regulated if they have become friable or have been or are likely

to be crumbled, pulverized, or reduced to powder during removal or demolition.

A new technology currently in the prototype stage thermally converts asbestos into glass. This process converts asbestos waste into a material (amorphous glass) that is not regulated by the NESHAP. However, the 1990 revision to the NESHAP regulation does prescribe standards for this type of process. The owner or operator of such a facility must receive approval from the EPA prior to constructing the facility. The regulation sets requirements for initial testing to demonstrate the effectiveness of the process, regular monitoring of the facility's operation, record keeping, and periodic reporting to the EPA. Section 02084 can be edited to specify this type of disposal, but the designer should take reasonable steps to determine that it is commercially available before doing so.

Work Area Decontamination and Clearance:

Section 01711 - Project Decontamination is used to specify methods for cleaning the work area following an abatement and for clearance testing prior to reoccupancy. This involves a multi-step cleaning of all surfaces followed by visual inspection and aggressive air sampling. Section 01711 can be edited to require clearance air testing by PCM, TEM or a combination of the two methods.

Product Compatibility:

The project designer should use care to ensure that all materials used during the abatement will be compatible with materials and finishes installed during reconstruction and renovation work

following the abatement. If there is a general contractor whose responsibility extends to all parts of the project (including abatement and reconstruction) the responsibility for inter-craft product compatibility could be assigned to this entity.

Contract Closeout: Section 01701 - Contract Closeout - Asbestos Abatement, is used to specify requirements for the administrative closeout of the project.

4. Specifying The Project

NIBS' MODEL GUIDE SPECIFICATIONS

The *Model Guide Specifications, Asbestos Abatement and Management in Buildings* is a compilation of guide specification sections which can be used as a manual to assemble technical project specification sections for:

- Removal of Asbestos-Containing Materials
- Encapsulation of Asbestos-Containing Materials
- Enclosure of Asbestos-Containing Materials
- Maintenance and Repair

In addition, the *Model Guide Specifications* can be used to prepare the specifications necessary to define the portions of an asbestos management and control program which are appropriate for an outside contractor to carry out. These sections are identified in the *Model Guide Specifications* under Maintenance of Asbestos-Containing Materials.

FORMAT

Sections in the *Model Guide Specifications* are arranged according to the 1988 edition of the Construction Specification Institute's *MasterFormat*TM which has become the standard for presentation of specification material in the construction industry.

*MasterFormat*TM organizes specification material into sixteen divisions which correspond to related construction activities. Sections further break down the work of each division to correspond to the work accomplished by common trades, thus facilitating organization of the work into subcontracts. Note: the 1995 edition of *MasterFormat*TM was released in March 1996. However, *MASTERSPEC*[®] has not yet been reorganized according to this revision. As such, this edition of the *Model Guide Specifications* follows the

organization of the 1988 edition of *MasterFormat*TM. At some point in the future, this may result in a re-ordering of information and a re-numbering of specification sections.

Most asbestos abatement activities are defined in Division 1, General Requirements, which contains sections on temporary facilities, quality control testing, and administrative requirements. Specification sections for removal operations are described in Division 2, Site Work, as specialized demolition work. Sections on encapsulation of asbestos-containing architectural finishes and enclosure are included in Division 9, Finishes, as they constitute specialized interior finish work. Repair and encapsulation of pipe insulation are located in Division 15, Mechanical.

SECTION ORGANIZATION

The *Model Guide Specifications* organize each section into the three part format of *SectionFormat*[™] by Construction Specifications Institute (CSI) and Construction Specifications Canada (CSC). This format includes:

Part 1 - General: includes such information as a description of the work in that section, identification of related contract documents, required submittals, inter-sectional coordination (related work specified elsewhere), and identification of referenced standards.

Part 2 - Products (products, equipment, or materials): specifies items physically provided by the contractor through the use of specific prescriptive or performance provisions or through reference to standards or other criteria.

Part 3 - Execution: defines requirements to be followed by the contractor in actually carrying out the work. This includes sequencing of the asbestos work with requirements of other sections and special requirements for methods which either can be described or incorporated by reference to installation standards.

COMPATIBILITY WITH MASTERSPEC[®]

To make the *Model Guide Specifications* easier to coordinate with other building renovation needs, they are in a format compatible with **MASTERSPEC[®]**, a master guide specification system copyrighted by the American Institute of Architects (AIA) and produced by AIA Master Systems. The system is offered on an annual basis to architects, engineers, and other design professionals for their use in preparing construction specifications for individual projects.

MASTERSPEC[®] consists of over 450 master specification sections written in a uniform format and consistent writing style. Because the **MASTERSPEC[®]** system is widely used by architects and other design professionals, the *Model Guide Specifications* have been made compatible with **MASTERSPEC[®]**, so

they can readily be used to develop consistent and coordinated specifications for related work. Also, they are more easily coordinated with the standard contract document forms published by the AIA and the Engineers Joint Contract Documents Committee (EJCDC).

The *Model Guide Specifications* can also be used with other commercially available guide specifications systems such as "SPECTEXT"[™] published by NIBS. In addition, they can be used with public domain guide specifications developed and required to be used by many government agencies for their projects. However, the format and content of such specifications should be carefully checked and coordinated to assure compatibility among all of the contract documents.

ADVISORY NOTES

In the text of the technical sections of the *Model Guide Specifications* notes are included to provide additional guidance to the user. These notes must be deleted

when preparing a project specification from this guidance document. The following is an example of the format and style of the notes:

NOTES ARE ALWAYS PRINTED IN CAPITOL LETTERS INSIDE OF A COMMENT BOX JUST AS THIS PARAGRAPH IS PRINTED. ALWAYS DELETE THESE NOTES BEFORE PRINTING A SET OF PROJECT SPECIFICATIONS, BUT ONLY AFTER THEIR USE IN EDITING TO SUIT THE PARTICULAR NEEDS OF THE PROJECT.

USING THE *MODEL GUIDE SPECIFICATIONS*

In writing project specifications, the *Model Guide Specifications, Asbestos Abatement and Management in Buildings* is used by selecting the sections appropriate for the project requirements and editing them as necessary to meet the needs of the project. Some sections are necessary for any type of abatement project. Other sections contain specific requirements and will be appropriate only for certain types of abatement work. The appropriate sections are selected from the "Master Table of Contents" to form the

basis for the specifications for removal, encapsulation, enclosure, or maintenance and repair.

Specification Sections: The following outlines the specification sections needed to describe the different types of work required for a complete abatement project. The sections are presented in a chronological order according to typical sequencing of the work:

● **General and Administrative Requirements:**

Are set forth in sections:

01013 Summary of the Work - Asbestos Abatement: This section provides an overview of the work, describes the contract documents, work of other contractors, and any other conditions that affect the contract. The asbestos-containing materials and their asbestos content are described. Specific requirements of site access and the contractors use of the job site are set forth. This section also describes air monitoring by the owner to ensure that the building beyond the work area remains uncontaminated. Air moni-

toring to determine required respiratory protection for contractor personnel is the responsibility of the contractor.

01028 Application for Payment - Asbestos Abatement: Administrative procedures involving application and certification for payments to the contractor are set forth.

01043 Coordination - Asbestos Abatement: This section sets forth administra-

tive and supervisory requirements relative to project coordination including meetings, reports, logs, and the experience and training of supervisory personnel.

01091 Reference Standards and Definitions - Asbestos Abatement: Terms used in the contract documents are defined. The format of the specification is explained. The role of industry standards in the contract is set forth.

01301 Submittals: Administrative procedures for the submittal, review and action on submittals is described in this section. This section also sets forth requirements for the contractors construction schedule.

● Abatement Work:

Requirements are set forth in the following sections:

01092 Codes and Regulations - Asbestos Abatement: sets forth many governmental regulations and industry standards which are adopted by reference and made a part of the contract (specifications). Notices and permits which must be made to or obtained from governmental authorities before start of work are also to be identified in this section. Some guidance documents developed by public and private organizations to assist asbestos abatement are also listed in this section. This section requires the addition of requirements (criteria such as codes, regulations, and referenced standards) specific to the project location. In order to ensure all such governmental requirements are noted, the owner and the owner's consultants must research the require-

01601 Material and Equipment - Asbestos Abatement: This section describes general requirements for materials and equipment provided by the contractor.

01632 Substitutions - Asbestos Abatement: This section sets forth the submissions necessary for the contractor to propose a substitute method for accomplishing the work, material, equipment or procedure. The basis for evaluation of such submissions is discussed.

01701 Contract Closeout - Asbestos abatement: This section sets forth administrative and procedural requirements for project closeout.

ments, include all pertinent provisions, and coordinate technical specification requirements with applicable laws and regulations.

01503 Construction Facilities and Temporary Controls - Asbestos Abatement: Sets forth the support facilities needed such as electrical and plumbing connections for the decontamination unit, storage and staging areas, and office space for the Project Administrator.

01513 Temporary Pressure Differential & Air Circulation System: Sets forth the procedures to set up HEPA-filtered fan units to maintain the asbestos abatement work area at a pressure lower than surrounding areas and accomplish ventilation

or cleaning of the air in the abatement area.

01526 Temporary Enclosures: Details the requirements for the sheet plastic barriers isolating the work area and decontamination areas from the balance of the building.

01560 Worker Protection - Asbestos Abatement: Describes the training, equipment and procedures necessary to protect workers against asbestos contami-

nation and other work-place hazards. Respiratory protection is covered in the following section.

01562 Respiratory Protection: Establishes procedures and equipment for adequate protection against inhalation of airborne asbestos fibers.

01563 Decontamination Units: Explains the setup and operation of the personnel and material decontaminations units.

● Asbestos Removal Work Procedures:

are described in the following specification sections:

01046 Cutting and Patching - Asbestos-Containing Materials: This section describes procedures to be used if asbestos-containing materials must be cut or drilled.

02061 Building Demolition - Asbestos Abatement: Removal of asbestos-containing materials from buildings that are to be demolished is described in this section. The removal of complete installations which contain asbestos-containing materials is also described.

02062 Non-Asbestos Demolition: This section addresses the removal of non-asbestos and non-contaminated materials prior to the start of asbestos abatement work.

02063 Demolition of Asbestos Contaminated Materials: This section describes the removal of non-asbestos-containing materials that are contaminated with asbestos dust or debris.

02081 Removal of Asbestos-Containing Materials: This section describes the wet removal of asbestos-containing materials using either amended water or a removal encapsulant.

02082 Removal of Asbestos-Contaminated Soil: The procedures for removing soil that is contaminated with asbestos are described in this section.

02084 Disposal of Asbestos-Containing Waste Material: The requirements for the proper containing, transport and disposal of asbestos waste are set forth in this section. This section can also be used to specify the disposal of asbestos by melting it into glass.

02085 Resilient Flooring Removal - Resilient Floor Covering Manufacturers' Recommended Non-Aggressive Work Practices: This section describes

work practices recommended for intact removal by flooring manufacturers which OSHA has accepted as an example of compliant work practices^a. These work practices can be performed without many of the regulatory controls required for Section 02087 (Resilient Flooring Removal - Aggressive Asbestos Abatement). Briefly, OSHA requires that a negative exposure assessment be made by the competent person, compliant (recommended) work practices be used, workers be properly trained, and the flooring be intact and likely to remain intact throughout the removal process.

02086 Hazardous Waste Management:

The requirements for the proper management, collection, transportation and disposal of hazardous waste are set forth in this section.

02087 Resilient Flooring Removal -

Asbestos Abatement: This section describes aggressive removal of resilient flooring, primarily with machines, as an abatement activity. In contrast to the non-

aggressive procedures of Section 02085, aggressive removal normally requires the use of full asbestos abatement measures.

In certain situations, use of aggressive removal methods, whether machine or manual, may offer benefits which outweigh the additional cost of full abatement procedures (for example, large scale, time-sensitive projects, equipment/worker availability, containment already present, and owner/manager decisions, or situations where the tile is badly damaged and already friable prior to abatement).

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- a. Recommended Work Practices for the Removal of Resilient Floor Covering. Resilient Floor Covering Institute. 966 Hungerford Drive, Suite 12-b. Rockville, MD 20850. (301)340-8580 - or - Armstrong World Industries, Inc. P.O. Box 3001. Lancaster, PA 17604. (800)438-3823

● **Enclosure Procedures:**

Are described in the following sections:

Masonry, metal panels, wood, and plastic can be and have been used for enclosure. If any of these materials are used, the appropriate section should be added to the specification.

09251 Gypsum Drywall Asbestos

Enclosures: This section describes the use of gypsum drywall as a means of providing asbestos enclosures.

● **Encapsulation Procedures:**

Are described in the following sections:

09805 Encapsulation of Asbestos-

Containing Materials: This section de-

scribes the application of encapsulants to asbestos-containing materials.

15254 Repair of Insulation and Lag-

ging: Describes repair of insulation on pipes and other equipment using procedures that involve primarily bridging encapsulants and fabric reinforcing.

● **Decontamination of the Work Area:**

After completion of abatement work, is described in the following sections:

01712 Cleaning and Decontamination

Procedures: Sets forth procedures to be used on contaminated objects and rooms which are not part of an abatement work area.

01711 Project Decontamination:

Describes the sequence of cleaning and decontamination procedures to be followed during removal of the sheet plastic barriers isolating a work area. This section also describes the analytical methods used to determine if the work

area has been cleaned to acceptable standards.

01713 Project Decontamination -

Microfibers: Describes the special procedures required to clean an area of contamination by asbestos fibers too small to be seen with an optical microscope.

01701 Contract Closeout: Details the closeout procedures to end the project once abatement work is complete including final paperwork requirements.

● **Repair and Maintenance:**

The following sections are intended to be used in securing contractor services in support of an operations and maintenance program. They are intended for repair and maintenance (O&M) activities that may involve disturbance of ACM.

01527 Regulated Areas: This section provides the language for specifying the set up of a regulated area, as required by OSHA, in the area in which small-scale short-duration work is to take place.

01528 Entry Into Controlled Areas:

Requirements for O&M activities such as entry into a space above a suspended ceiling where there is an asbestos-containing fireproofing are set forth in this section.

01529 Mini-enclosures and Glove Bags:

Control procedures for maintenance activities that involve the disturbance of small areas of asbestos-containing materials are set forth in this section.

01561 Worker Protection - Repair and

Maintenance: describes the training, equipment and procedures necessary to protect workers against asbestos contamination and other work place hazards during maintenance activities. Respira-

tory protection is covered in the following section.

01562 Respiratory Protection: Establishes procedures and equipment for

adequate protection against inhalation of airborne asbestos fibers. This is the same section as the section used for asbestos abatement work.

5. Finding a Contractor

NEGOTIATED CONTRACTS

Private building owners may prefer to negotiate rather than bid a project because the owner has confidence in a particular contractor, wants to save time, or wishes

to avoid publicity. If it is decided to negotiate, the qualifications of the contractor should be evaluated in the manner set forth in this section.

BIDDING

Public building owners typically are legally required to bid construction projects. Many building owners both public and private prefer to bid construc-

tion projects to ensure good competition and obtain the lowest reasonable price for the work.

● Private building owners:

Have considerable latitude in the bidding process. The following steps will help identify a qualified contractor.

Evaluate qualifications of all bidders using the factors outlined later in this section under "Evaluating Contractor Qualifications."

After receipt of bids, meet with the three low bidders to determine if there is a significant difference in terms of manpower available, current workload,

scheduling, insurance, bonding or other factors that may affect the award. These factors should be considered before awarding a contract.

In privately bid work many owners feel that there is normally no reason to require a bid bond (or payment and performance bonds). These owners feel that they can exercise sufficient control over the project and that this protection is unnecessary.

● Bidding Public Projects:

Normally, public building owners are legally required to accept the lowest responsible bid. A responsible bidder is one who meets the qualification requirements set out in the bidding documents and also meets any requirements set forth in the Contract Documents. This means that in theory, a bid from an unqualified

contractor can be rejected. Unfortunately, in practice it is sometimes difficult to determine if a contractor is qualified, and there is considerable pressure to accept the low bid whether the contractor is responsible or not. This, combined with the fact that public biddings are usually required to be publicly advertised makes the issue

of contractor qualification an important one.

Unless disallowed by law, it may be advantageous to have contractors submit qualification information either at or before the time of bidding. In some jurisdictions public authorities are allowed to

accept qualification statements from contractors prior to bidding and allow only pre-qualified contractors to bid. Where allowed, this practice is recommended. A compromise frequently allowed is to require contractors to submit qualification statements at the time of bidding.

EVALUATING CONTRACTOR QUALIFICATIONS

It is critical to the success of the project that the contractor selected be qualified for the work. This qualification includes technical competency of the organization, its staff and workforce, as well as the capacity to carry out the project. Many abatement contractors are small organizations without the financial resources, manpower, or organizational skills necessary to carry out a large project. If the project involves work other than abatement work the contractor's capabilities in these areas must also be evaluated. It may be prudent to require that a subcontractor be engaged for this non-abatement work.

It may not be clear whether a contractor is qualified for a particular project. For example, a small contractor with impeccable technical qualifications may be undertaking a large project where there is a real question about his capacity to properly manage and support the project. If a private sector owner discerns a weak point in a contractor's capabilities, it may be worthwhile to seek a negotiated solution to the problem. For the small but

technically excellent contractor, this may mean teaming up with a larger general contractor who can provide logistical and financial support for the project. This sort of negotiation can be accomplished in the public sector if a "construction manager" form of project organization is used.

Contractor's Qualification Form: AIA Document A-305, Contractor's Qualification Statement, 1986 Edition, can be used to organize and evaluate an asbestos abatement contractor's capabilities. In addition to collecting information about the contractor's firm type (e.g. corporation, partnership, joint venture, etc.), the form asks the contractor to describe how the business is organized, licenses held, experience, references, and financing. Other qualifications in addition to those listed may be appropriate for specific jobs. The review of a contractor's qualifications is only to determine suitability for the project and compliance with the contract requirements. Care must be taken to prevent this review from establishing an endorsement of the contractor or any of the contractor's documents or procedures.

● Technical Qualifications:

The first step to determine if the contractor has the technical capability to accomplish the work. The contractor needs to have the skills and equipment necessary to accomplish the work. If the contractor lacks organizational or fiscal capability these deficits can be overcome by teaming a technically excellent contractor with skilled general contractor. If the contractor lacks the technical capability then there is nothing that can be done to salvage the situation. To determine technical capability evaluate the following:

Past projects of similar size and type:

Evidence of successful completion of projects of similar size and scope gives a strong indication of the contractor's capability. However, there are several caveats:

- Supervisory personnel and key members of the work crew on past successful projects should be the same as those proposed for the current project.
- The types and extent of the asbestos-containing installation(s) in past projects should be similar to those of the current project.
- The types of asbestos involved should be the same. Amosite and crocidolite are very difficult to wet. Specialized skills are needed in projects regarding these materials to maintain low airborne fiber levels.
- If the project is in a high-rise building the contractor should be able to demonstrate experience with the specialized problems encountered

(such as access, isolation of elevators, stair towers, vertical chases, etc.).

Firm History: The firm's history, a statement of qualifications, and list of principals with resumes.

Training and Accreditation / Certification:

The contractor should use trained supervisory personnel and workers. Specific training is required in some states. At this time, approximately 30 states have some sort of licensing or certification requirement for supervisors and workers. Training and licensing is required for school projects as a result of the AHERA regulations. The Asbestos School Hazard Abatement Reauthorization Act (ASHARA) of 1990 required the EPA to extend these requirements to commercial and public buildings, effective late 1992. In addition, OSHA requires the contractor to have a "Competent Person" on site (see page 28, Section 3). This individual is required to have completed a training session at an EPA regional Training Center or an equivalent course. There may also be state or local requirements that apply.

Supervisor: The contractor's on-site supervisor is probably the single most important person on the job. The supervisor needs to be technically qualified and skilled in supervisory and organizational skills. Without a good supervisor it will be virtually impossible to have a satisfactory project. It is a good idea to have the resume of the proposed supervisor included as part of the contractor's qualification submittal. Evaluate the supervisor in much the same way as the contractor. Look for a history of successful projects,

and a pattern of increasing project management responsibility of progressively larger and more complex project. The supervisor should have had experience with projects of similar type and magnitude to the project in question. Once a project has been awarded to a contractor based on a particular supervisor, insist that the supervisor not be changed without the owner's prior approval. Also look for the following:

- Training is required by OSHA as a Competent Person, and accreditation as a supervisor under the AHERA regulation. This originally applied only to schools, but the Asbestos School Hazard Abatement Reauthorization Act of 1990 required that the EPA extend this requirement to commercial and public buildings. State and local regulations may also have accreditation, certification or licensure requirements that apply.
- If a supplied air respirator system is used a certification of training by the supplier of the supplied air equipment may be required.

Workers: The contractor must have skilled and experienced workers. Sometimes these workers will be supplied by labor pools or out of a local union hall. This is acceptable as long as the contractor has a backbone staff that has worked together and with the supervisor before.

- Accreditation as an asbestos abatement worker is required by the OSHA and the AHERA regulations. This requirement was originally for school projects, but the Asbestos School Hazard Abatement Reauthorization

Act of 1990 required that the EPA extend this requirement to commercial and public buildings. State and local regulations may also have accreditation, certification or licensure requirements that apply.

- Worker training: Workers shall be trained in the specific operations they will have to perform to successfully complete the work.

Respiratory Protection Program:

OSHA regulations require that the contractor establish and maintain a respiratory protection program. This requires a written program manual, fit testing, training, record keeping, and a number of other requirements (refer to 29 CFR 1926.1101 and 29 CFR 1910.134). The ability to produce the written documentation required by OSHA without delay should be a minimum qualification requirement. OSHA requires that these documents be available upon demand. If the contractor is unable to do this it may indicate an inability to comply with necessary worker protection requirements.

Respiratory Protection Program

Administrator: The following certifications are not required by the OSHA regulation, but are useful in determining competency.

- Certification of completion of a comprehensive respiratory protection course, or letter certifying training from a Certified Industrial Hygienist.
- If a supplied air respirator system is used, a certification of training by the supplier of the supplied air equipment may be required.

Hazard Communication: The contractor should be able to demonstrate compliance with the OSHA Hazard Communication standard (29 CFR 1926.59). This includes a written Hazard Communication program.

Medical Surveillance Program: The contractor should be able to provide a written program and evidence of its implementation as required by 29 CFR 1926.1101.

Air Sample Data: From past projects with similar processes, materials, work practices, control methods, and environmental conditions. This data should show that the contractor has successfully controlled airborne fiber levels on a similar project. The types of sample that are of interest are those taken during the work inside and outside of the work area, personal samples, and clearance sampling (particularly TEM)

Industrial Hygiene Capability: The contractor should have the capability to adequately implement worker protection programs. This may require a staff industrial hygienist or demonstration of an ongoing working relationship with an industrial hygienist.

● **Business Capability:**

The contractor should be able to demonstrate the business capability to complete the project. It is not wise to permit a

Past Performance: Performance on past projects should be a pretty good indicator of what can be expected on the current project.

- **Successfully Completed Projects:** Projects that are completed on time and within budget with a minimum of change orders. Repeat clients and expressions of satisfaction from owner, designer and project monitor are convincing evidence of good performance.
- **Problem Projects:** Halted projects, projects not completed on schedule, projects not completed within budget, large numbers of change orders, high air levels, spilled material outside of work area.
- **Fines Levied or Citations Issued by Authorities:** The National Asbestos Registry (NAR) maintained by the EPA may be helpful.

References: References from past owners, A/E's, environmental consultants, laboratories, etc.

Equipment: The contractor should have the proper type of equipment in sufficient quantity for the project.

bidder to start a project that has a carrying cost too large for the contractor to support. The following can be indicators of the

contractor's business capability.

- Bonding Capacity
- Dun & Bradstreet Rating

- Credit References
- Project History

BIDDING DOCUMENTS

The documents that set forth the rules for the bidding of a project and the basis for awarding the bid are referred to as the Bidding Documents. Because these documents refer to activities that terminate upon the award of the contract they should not be made a part of the contract documents. Many times the bidding documents are not bound into the project manual as they apply only to the bidding process and not to the construction

contract. Standard documents produced by building community organizations are available to aid in the preparation of project bidding documents. Such standard documents are published by the American Institute of Architects (AIA) and the Engineers Joint Contract Documents Committee (EJCDC). The owner should seek advice from qualified legal counsel on the appropriate manner of setting forth bidding requirements.

● Notice to Bidders:

Also referred to as the Invitation to Bid, the Notice is a solicitation of bids for the work. In public bidding this notification usually has to be published in a local newspaper. For asbestos abatement projects it is good practice to specifically notify or invite bids from contractors who

are known to be qualified. This notice generally describes when and where bids will be received, availability of contract documents, notice of pre-bid meeting, availability of the site for inspections, contact person for the owner and design team.

● Instructions to Bidders:

Sets out the procedures that will be followed during the bidding. This section of the bidding documents tells potential contractors how the owner intends to

evaluate bids and make an award. It is useful to use a standard form such as AIA document A 701, "Instructions to Bidders," or the "Guide To The Preparation of

Instruction To Bidders," EJCDC document 1910-12. These documents spell out the "rules of the game" as they are understood by the construction industry for all

types of construction contracts, not just for asbestos abatement work.

● **Modification of Bidding Documents:**

If the bidding documents need to be modified after initial publication (during the bidding process, but before bids are received), the written form of notice is known as an addendum. This need may result from responses to questions from bidders. Note, "real questions" usually come from bidders via telephone calls, letters, or other discussions prior to the date bids are due. Seldom are cost related questions asked during a pre-bid conference because this gives the same information to competing bidders. However, as the owner or the owner's agent, it is important to be careful to provide the

same information to all bidders. If the response is a reasonable interpretation of clear information in the bidding documents, it may not be necessary to transmit the response to all bidders; however, if the response conveys new information, it should be incorporated in a written addendum for all bidders. Addenda are frequently transmitted by certified mail with return receipt or some other means that documents receipt. Frequently the bidder is required to list all addenda on their bid. This may help avoid disputes about addenda that have not been received.

● **Bid Form:**

Without definitive instructions, bids are not likely to be submitted in like format or in consistent manner. This can make it extremely difficult, if not impossible to compare bids and fairly award the contract. A required bid form ensures that bids will be in both a common format and contain consistent information so logical comparisons can be made. This becomes particularly important if the owner is seeking pricing for alternatives to the base bid work. See EJCDC Document 1910-18, Suggested Bid Form and Commentary for Use for more information. A Bid Form

should contain:

The base bid amount: This is the cost for performing all the work and supplying all the labor, materials, and equipment, including overhead and profit, required to complete the project as designed.

Alternates (either add or deduct): Alternates are the bids for increases or decreases to the base bid for changes to the work. For example, if the owner wanted to find out what it would cost to encapsulate rather than remove, the bid

form could ask for a proposal on this as an alternate. This would be stated as an addition to or deduction from the base bid if the material were encapsulated rather than removed. The exact nature and extent of the change in the work must be as carefully detailed and specified as the base bid work. In this case a specification for the encapsulation would have to be in specifications. The selection of alternates could result in the selection of one bidder over another. The bidding documents should define the protocol for applying alternates so that the selection of alternatives cannot be used to manipulate the bidding.

Unit Prices: When the owner is not sure of the quantities of work that will be required he or she may seek unit prices. These are prices for a unit of work (e.g. removal of insulation from one foot of 3" diameter pipe, removal of one square foot of fireproofing). The bid form should include a description of the particular unit and a place for the contractor to indicate his bid for this unit of work. Any quantities given in the bidding documents should be clearly indicated as for bidding purposes only, with actual quantities used for determination of payment. This option often requires detailed coordination with the drawings. It is important that unit-price based bids be used carefully. Generally, more accurate bids are received when based on actual information in the contract documents. This permits the

contractor to base the proposed costs on known quantities rather than rough estimates.

Acknowledgment of Understanding:

Acknowledgement by the bidders that they understand the contract documents and bid documents (including addenda) is important. These acknowledgments should be included as an integral part of the bid form so that the act of submitting a bid becomes an acknowledgement. This protects the owner from claims that the work was inadequately described or unfairly awarded because of confusion on the part of the bidders.

Acknowledgment of Addenda:

Frequently addenda will affect the quantity, quality, or schedule of work involved and as such affect the contractor's bid (price). For this reason it is important to be assured that the bidder did in fact receive all addenda, and acknowledge same in writing with his bid.

Signature, Corporate Seal and Date:

The bid must be binding upon the contractor and as such signed and/or sealed as necessary to make it binding. Bid requirements stipulate the bid must be signed by at least one principal of the bidding corporation.

● **Bid Bond and Bid Bond Certification:**

Are mechanisms used by the owner during the bidding process to ensure that the bids are offered in good faith. The bid bond is intended to defray any costs of re-

bidding or negotiating if the low bidder is unqualified for the project or his bid is deficient for some reason.

Bid Bond: A bond posted by the bidder that guarantees the bidder is "responsible" and the bid complies with the requirements of the bidding and contract documents. If the low bidder fails to enter into a contract, the owner's costs to obtain the services from other qualified bidders will be reimbursed up to the amount of the bid bond. Or, if the bidder is deficient in the terms of the bond, the bid may be determined to be "non-responsive." In this case, the bid bond may be forfeit with the face value being awarded to the owner.

In practice this rarely happens. Usually, if an owner determines that a bidder is non-responsive, the bid bond is often used as a negotiating tool to encourage the bidder to withdraw his bid. If the next low bid is substantially different from the non-responsive bid the bid bond may be forfeited to compensate the owner for having to accept a higher price for the work. AIA Document A310, Bid Bond, provides a form for this bond that sets forth the conditions and amount of bond forfeiture.

Bid Bond Certification: Is a certification prepared by the insurance company writing the bid bond that they are aware that the project is for asbestos abatement and that it requires specialized knowledge and equipment on the part of the contractor. The insurance company is notified of two things by the Bid Bond Certification. First, that the contractor will, if low bidder, be awarded the bid. Second, if the contractor is unqualified, he or she will be found to be a non-responsible bidder and the Bid Bond will be forfeited. This serving of notice on the insurance company makes it difficult for an unqualified contractor to secure a bid bond, but generally poses no problem for experienced contractors. On public bidding processes this allows the insurance marketplace to weigh the qualifications of the contractor and eliminate those who are clearly not qualified. This is generally an unnecessary precaution for projects bid in the private sector. There are no standard forms available for a bid bond certification.

● Construction Performance and Payment Bonds:

These two types of construction bonds are widely used for private projects and sometimes required for public projects. The construction performance bond is used to assure that funds are available to complete construction. The construction payment bond is used to assure that funds are available to pay for labor, materials, and equipment used in the construction. This provides a mechanism to ensure the right to recovery for workers, suppliers, and

subcontractors. This is an alternative to mechanics lien laws applied to private work. See EJCDC Document No. 1910-28A, Construction Performance Bond, and EJCDC 1910-28B, Construction Payment Bond.

Other standard forms include AIA Documents A-311, Performance Bond and Labor and Material Payment Bond, and AIA Document A-312, Performance Bond

and Payment Bond.

● Pre-bid Meeting:

All bidders should be **required** to attend a pre-bid meeting which should include the following functions:

Tour of the Work: The bidder needs to assess the amount of effort involved in the contract. This makes it imperative that the contractor see the material involved, in order to judge its adherence to the substrate, internal cohesiveness and accessibility. In some circumstances it may be necessary to use photographs or video tapes where bidders' access to the material is not possible (for example, with fire proofing above suspended ceilings in an occupied office building). It should be made clear to the bidders that the tour is intended to display representative areas and is not a substitute for determining contract requirements defined in the contract documents. The utility and feasibility of allowing additional investigation of the building by the bidders should be evaluated. On some projects, escorted but unguided access to the project areas may clarify conditions for bidders and result in more accurate pricing.

Explanation of Contract Documents: The asbestos abatement industry is a young and maturing discipline. Many contractors in the business are technically proficient but inexperienced at the business of contracting. Many are only

familiar with the role of a subcontractor. This makes it important, particularly on small projects, that the contract documents be explained and that the drawings and specifications be reviewed so that all bidders understand the contract requirements. It does neither party any good for the contractor to discover after starting work that the specifications or general conditions require more work than has been allowed for.

Care must be used in characterizing the nature of the information given to bidders at the pre-bid meeting or during later contact. Questions should not be answered in a manner that provides new information without a written addendum. The bidder should be directed to the portion(s) of the contract documents that answer the question. If the answer can not be gained in this manner, a written addendum should be issued to all bidders. Each bidder should reach their own determination of the contract requirements. Any ambiguities should be resolved by addendum rather than with a verbal response or explanation of the contract documents. It may be advisable to transmit minutes of the pre-bid meeting as an addendum. If the owner believes that the contract documents are clear, he or she may respond to a question by telling the bidder to bid as they interpret the documents.



6. Contracting the Work

THE CONTRACT BETWEEN THE OWNER AND CONTRACTOR

The asbestos abatement contract is an agreement between the owner and the contractor. The several parts of the agreement define the scope and terms of the work in explicit detail, and which party is responsible for actions identified in the contract documents. The Architect,

Engineer or Environmental Consultant may serve as the owner's agent in dealing with the contractor, but they are *not* parties to the contract. The contract defines the role of such agents of the owner.

DEFINING SCOPE OF THE WORK

The contract documents define the scope of the work. The contractor will be responsible in his contract with the owner only for that work which has been identified and described by the designer. If additional work is discovered by the contractor during the course of construction, the cost of performing this work will be added to his contract by change order.

Descriptions of the work which tell the contractor to remove, enclose, or encapsulate or perform some such operation on "all the asbestos" in a given building will usually result in enormous uncertainty on the part of the bidders. This uncertainty normally translates into higher cost and disputes about the extent of the work, and such all inclusive phrases should be avoided.

THE CONTRACT DOCUMENTS

The contract documents for a construction project include:

- Owner Contractor Agreement
- General Conditions (of the Contract for Construction)
- Supplementary and Other Conditions
- Specifications
- Contract Drawings
- Addenda
- Modifications

The contract documents are complemen-

tary, meaning that what is called for by one is as binding as if called for by all. It is important to coordinate carefully between different parts of the contract documents to avoid conflicting requirements. Usually, to avoid conflicts, information is only given in one location. Thus, it is of vital importance that the documents be well coordinated. This means that during the course of their development, establishing and using excellent communications links among the members of the design team is an absolute

necessity. If addenda and modifications are needed they are usually developed under time pressure. It is most necessary to provide proper coordination precisely when there is precious little time in which

to do so. The preparation of a comprehensive and well coordinated set of contract documents is the best defense against these problems.

● Owner Contractor Agreement:

Standard agreements for building construction projects such as AIA Document A-101, "Standard Form of Agreement Between Owner and Contractor," or EJCDC Form 1910-8-A-1, "Standard Form of Agreement Between Owner And Contractor On The Basis Of A Stipulated Price," may be used for asbestos abatement work in buildings. Such documents

identify the parties to the agreement, identify the owner's consultants, define the contract documents, set the time for commencement and substantial completion of the work, set the contract sum and schedule for progress payments, establish miscellaneous provisions, and contain the signatures of the owner and contractor required to execute the agreement.

● General Conditions:

Published standard form documents such as AIA Document A-201 "General Conditions of the Contract for Construction," or EJCDC Form 1910-8, "Standard General Conditions Of The Construction Contract." Such documents define applicable terms and detail the responsibilities of each party involved in the construction process. They describe other general contract conditions such as insurance, schedule, cost, changes, warranties, payments, termination, and disputes. The documents are in generalized form and **require** modification to provide for specific project needs.

Although there are wording variations throughout, the two documents are conceptually harmonious in most respects.

The following differences between the AIA and the EJCDC General Conditions and related provisions in these documents relative to asbestos abatement projects are relevant:

Shop Drawings: The AIA General Conditions specifically note that Shop Drawings are **not** contract documents; the EJCDC General Conditions are silent on whether or not shop drawings are contract documents. Both documents, use the term "approval" with respect to the action the Architect/Engineer is to take with respect to contractor's shop drawings submissions. This should be carefully considered if the A/E's policies are to use other terms (such as "no exception taken," etc.) in the actions taken on such submittals.

With respect to the review and approval of shop drawings, both the AIA and EJCDC General Conditions use the terms "design concept" to limit the A/E's responsibility.

Clarification of Terms: All of the AIA documents refer to the design professional as "Architect." All of the EJCDC documents refer to the design professional as "ENGINEER." In using these documents it is necessary to clarify the use of these terms in the Supplementary Conditions. This coordination must also include the terms used to describe these entities in the technical specifications.

Stop Work Provisions: In the current (1987 edition) AIA General Conditions, subarticle 10.1 (10.1.2, 10.1.3 and 10.1.4), Safety Precautions and Programs, the contractor is required to stop work if material reasonably believed to be asbestos, which has not been rendered harmless, is encountered and report the condition to the owner and the Architect in writing. These provisions further preclude the

owner from requiring the contractor to perform work relating to asbestos without consent. A written agreement between the owner and the contractor is required in order to resume work in the affected area. Further, the document requires the owner to hold the contractor, the Architect and the Architect's consultants harmless against essentially all losses and claims arising out of the asbestos condition. The article also applies to PCB's; thus, it cannot simply be deleted. Therefore, the normal practice of modifying this language by reference in the Supplementary Conditions may be inadequate. It is recommended that A/E's, owners and environmental consultants confronted with this problem consult with competent and experienced legal counsel.

Payment of Subcontractors: AIA General Conditions address contractor - subcontractor relations with respect to payment to subs, etc. The EJCDC General Conditions take a more arms-length approach to this issue.

● Supplementary Conditions:

Where portions of the General Conditions are inappropriate for a specific project or do not include needed provisions, the Supplementary Conditions are used to make needed modifications and additions. The criteria for qualifying contractors in asbestos abatement projects and specialized insurance requirements are frequently identified in this section. AIA form A-511, "Guide for Supplementary Conditions" and EJCDC document 1910-17 "Guide to the Preparation of Supplemen-

tary Conditions," both give useful guidance. There are several specific issues that need to be addressed in the supplementary conditions for an asbestos abatement project. The following list some of the variations from normal construction practice. The standard forms for the General Conditions will need to be changed by the Supplementary Conditions to accommodate these variations. The contract documents that define the agreement between the owner and designer will

also have to reflect the relationships described below. Refer to the section in this introduction on “The Owner-Designer Contract.” The advice of legal counsel should be sought when defining these relationships.

The project administrator is sometimes given the authority to direct the contractor to change work practices. This should be set forth in the Supplementary Conditions. The circumstances under which this can happen should be set forth in the appropriate Specification sections.

The contractor should not be allowed to work unless the project administrator is on-site. The contractor also must give timely and sufficient notice to the designer and project administrator about when on-site activities will occur.

If the project administrator is authorized by the owner to direct the contractor to stop work, the contractor’s required response to a stop work order should be set forth in the Supplementary Conditions. Generally this should be limited to circumstances where the contractor’s actions cause or make it probable that asbestos contamination of the project site will occur. This substantially changes the roles and potential liabilities for the contractor, owner and designer. In writing the supplementary conditions make sure that, except for asbestos contamination, containment and prevention under specific circumstances to protect the owner’s interest, the project administrator is not

given control or charge of, nor is made responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the work. The project administrator should not be responsible for the acts or omissions of the contractor, sub-contractors or any other persons performing any of the work, or for the failure of any of them to carry out the work in accordance with the contract documents.

The contractor needs to be required to give access to the work to the project administrator at all times during the project.

Problems such as a containment failure or supplied air system problems can create health and safety issues that require immediate correction. On asbestos abatement projects, the on-site project administrator is frequently given the authority to stop work. Many consultants and owners feel that this is the only way that the owner’s interest, and the health and safety of the occupants of adjacent areas, can be protected. However, the responsibilities and associated liabilities for the parties in the construction contract change from normal practice when the project administrator and designer are given the authority to stop work. The owner, designer, and project administrator may be accepting some of the contractor’s responsibility for correctly executing the work. It is strongly recommended that advice of counsel be sought if this change is made.

● Other Conditions:

Scheduling and liquidated damages

provisions are sufficiently important that

they are frequently spelled out in special specification sections as Other Conditions.

They are sometimes referred to as Special Conditions.

● Specifications:

Specifications should be organized in the previously described CSRF sixteen division and three part section format. These specifications give the details of materials and work practices which must

be followed. The NIBS *Model Guide Specifications* must be edited for use as project specifications for a specific project.

● Drawings:

A graphic and pictorial description of the work sufficiently specific that qualified contractors are able to determine the extent of the work, and the location and quantity of material and labor needed to complete the project. Typical drawings required include:

- Site and Floor Plans
- Reflected Ceiling Plan

- Sections
- Details
- Supplied Air System Schematics and Details
- Temporary Electrical and Plumbing
- Elevations (interior and exterior)
- Photographs
- Schedules

● Addenda:

Changes to the drawings, specifications, or other bid documents issued prior to the execution of the Owner-Contractor agreement. All responses to questions

raised during the bidding period are handled by addenda so that all parties receive the same information.

● Modifications (Change Orders):

Used to detail changes in the work which occur after executing the

Owner-Contractor Agreement.

Change Order: A formal written agreement between the owner and contractor which has been reviewed and approved by the Owner's Representative for a change in the work which will result in a change in cost or schedule. Any change which results in a change of cost or schedule must be accomplished via Change Order. Change orders are normally signed by the owner, owner's representative and contractor.

Field Order: A directive issued in the field by the Owner's Representative to the contractor for a change in the work that will result in neither a change in cost or schedule. Field orders are only recognized in EJCDC Documents. They are not appropriate in contracts based on AIA Documents.

Construction Change Directive: A written order directing the contractor to perform a change in the work. This directive is used in the absence of total agreement on the terms for a change order.

When agreement is reached between the owner and contractor on the cost and time adjustments, a change order is executed.

Clarification: An explanation of the intent of the Contract Documents issued by the architect/engineer to the contractor. Usually this will result from a question by the contractor. A clarification does not change the scope of the work in a way that affects either the cost or the schedule.

Typically, for either Field Orders or Clarifications, if the contractor believes the cost or time are affected, the Contract Documents will require that the owner be so notified in writing within a specified period of time. Unless this is done, the contractor is bound to the direction in the modification. Also, the contractor is **obligated** to accomplish modifications in the work **only** if such modifications are consistent with the general scope of the work.

7. Construction

OWNER

During construction the owner's primary responsibility is to pay the contractor's bills in a timely fashion. The owner also directs change orders. Other responsibilities of the owner, that may relate to preparation of the site, relocating the owner's activities, etc., are defined in the contract documents. The NESHAP regulations make the owner responsible for notifications and liable to fine if they are not properly made. The owner is also

responsible under NESHAP for surveying to locate asbestos-containing materials prior to renovation or demolition. OSHA requires the owner to locate ACM and PACM and notify the contractor about its location and quantity. Outside of the context of construction contracts, OSHA has additional notification and signage requirements for owners.

DESIGN TEAM

Normally, the design team administers the contract for construction. This involves on-site monitoring of the contractor's work (including air monitoring) to assure that the specifications are being complied with.

The design team normally reviews and certifies the contractor's requests for payment.

CONTRACTOR

Responsible for performing the work in accordance with the contract documents. The contractor generally is responsible for

making the notifications and securing permits as necessary for the work.

BEFORE START OF WORK

Fully Executed Owner - Contractor Agreement: Before any work starts on the project it is imperative for the contract between the owner and contractor to be fully executed and for both bonds and insurance to be in place. This avoids misunderstandings and claims

that can result when work is started under a letter of intent or other informal "handshake" arrangements.

Preconstruction Submittals:

There are a number of submittals that are necessary for adequate preparation of the project. These submittals should be approved by the owner's representative and returned to the contractor before mobilization to the work site. A list of major submittals required for an asbestos abatement project can be found at the end of Section 01301 - Submittals.

Occupant Meeting: It is good practice to hold an informational meeting for all building occupants. This can avoid misunderstanding and fear during the course of the project.

Preconstruction Meeting: A meeting should be held at the job site before work begins. This meeting should have in attendance the following:

- **Contractor:** The supervisor who will be on site and a representative from the home office who is authorized to

make decisions within the scope of the contract.

- **Owner:** An individual who is familiar with the building, its mechanical systems and operation, and a representative who can make decisions for the owner.
- **Design Team:** The on-site project monitor and a representative who has the authority to make decisions.

This meeting is intended to anticipate and resolve problems before they occur.

Frequently this will be the first time that the field personnel involved in the project will meet. Any conditions that need additional clarification or have changed since project design should be discussed and resolved, (for example, the precise location of electrical, plumbing and mechanical systems; schedule of the building use; use of the building's facilities by the contractor; or location of the decontamination facility.

PROJECT ADMINISTRATION

● On-Site Project Administrator (Project Monitor)

In asbestos abatement projects, the standard contractual relationships among the owner, design professional and contractor vary from traditional construction practice in the area of on-site project administration. The duties, responsibilities and limits of authority of an owner's project representative have been well defined by past construction practice as a passive observer who reports to the design professional or owner. In an asbestos abatement contract this individual

should have a much more active role with greater authority and responsibility. The project administrator is extremely important to the project. The owner should take great care in selecting a qualified individual for this position.

There are three categories of skill required of the project administrator. First the project administrator is a contract administrator who observes the work of the

contractor to ensure that it is performed in accordance with the contract documents. As contract administrator the project administrator either directly reviews and certifies payment requests and change orders or functions as the field component of the design team in accomplishing these tasks. The second task is that of an air sampling technician securing samples. Samples will be taken on a daily basis inside the work area to verify that the contractor's work procedures are keeping airborne fiber levels within required limits. Samples will also be taken outside the work area to verify that the building outside of the work area remains uncontaminated. At the completion of the work the project administrator will perform the visual inspection for the owner and secure clearance air samples. The final skill required is that of an analyst capable of reading the samples collected. On small projects all three roles are normally carried out by a single individual. On large projects there may be a separate individual responsible for each part of the work.

To protect the owner's interest, the project administrator should have specific written authority from contract documents and the owner to stop all work if a specific situation arises. This *Guide Specification* contains performance requirements in specific areas that call for abatement work to stop if the requirements are not met (e.g. airborne fiber counts, integrity of work place isolation). There is also a need for "response time limits" to contractor inquiries. These limits prevent the project monitor from indefinitely or unreasonably holding up progress on the job.

In an abatement project, the owner is

paying for a procedure as well as a finished project. If the procedure is improperly carried out, serious problems can occur in a matter of minutes. Serious violations of proper asbestos abatement procedures can create potential danger to workers, violation of applicable laws and regulations, dissemination of asbestos fibers beyond the work site, or asbestos contamination remaining after completion of work. The only protection the owner has is continuous on-site monitoring of the work by a professional able to make judgments at the work site. This professional is essentially responsible to the owner for contract enforcement.

As the abatement process proceeds, there is generally continuous interaction between the project administrator, as the owner's quality control agent, and the contractor. During this interaction, the project administrator must be aware of his responsibility and authority with respect to the contract between the owner and contractor. It is possible for the project administrator to compromise the owner's contract by becoming over involved with direction to the contractor or even assisting in the work.

It is critical that the project administrator be aware of the fine line between quality control for the owner and usurping the contractor's responsibility to perform the work. If this line is crossed, the responsibility and corresponding liability for successful abatement could in part be transferred from the contractor to the owner.

The project administrator is frequently the most technically knowledgeable individual on the job site and will continually be

called upon to interpret the contract requirements to meet specific conditions that arise during the work. As such, this person must be an expert in the reasons and purpose for the procedures specified so that they can be adapted to a particular situation and still maintain the intent of the contract.

The project administrator needs to be a contract administrator knowledgeable in asbestos abatement techniques and an air-monitoring technician able to collect air samples. This individual should be trained and accredited/licensed as an asbestos abatement worker and supervisor. This

individual will collect air samples. Depending on the project this individual may also need to be a trained optical (PCM) microscopist, having successfully completed a NIOSH 582 or equivalent course, and analyze samples in a lab set up at the job site. Air monitoring is carried out to ensure that airborne fiber levels in the work-site remain under control and asbestos fibers do not drift out of the work area and into the rest of the building or outdoors. Frequently, an almost immediate turn around time on air sample analysis is needed if airborne fiber counts are high or contamination beyond the work-site threatens.

● **Contract Administration:**

During construction the owner's representative acts as the contract administrator. This is primarily an office function involving the processing of paperwork that tracks and documents the project. This function involves the owner's representative monitoring the contractor's Performance.

Processing Payment Requests: On a periodic basis, as established by the contract documents, the contractor makes a request for payment to the owner's representative. The owner's representative makes a determination if the level of completion claimed by the contractor and hence payment requested is indeed owing. This determination may be made based upon an estimation of the percentage of completion of the project that has been achieved, it may be based on man-hour and material expenditure, or the number of

units (such as linear feet of pipe or square feet of fireproofing) that have been completed. If the owner's representative concurs with the contractor's request he or she certifies the Request for Payment and it becomes a Certificate for Payment that is submitted to the owner for payment.

Processing Change Orders: If there is a change in the work which results in a change in cost or in the time required to complete the work, a Change Order will be processed. The change order usually originates with the owner's representative and is based on a proposal that has been secured from the contractor.

Processing Submittals: The owner's representative reviews and approves shop drawings, samples, schedules, and other submittals from the contractor.

WORK AREA DECONTAMINATION

During the asbestos abatement the work area will have been thoroughly contaminated with airborne fibers, dust, debris, slurry, and removed material. The work area decontamination is a sequence of operations designed to remove all debris and dust and also clean the air of fibers before the work isolation measures are removed and the space reoccupied.

The increased use of Transmission Electron Microscopy (required by AHERA for school projects) has affected the way in which work area decontamination is carried out. In current practice both surfaces and the air in the work area are

cleaned. Cleaning surfaces not only removes visible debris and residue, but also removes larger fibers (visible with an optical (PCM) microscope). Many small and thin asbestos structures (visible only by TEM) are re-entrained by the cleaning process. These thin fibers stay airborne in the removal area almost indefinitely rather than settling on surfaces. To ensure clearance by TEM, it is necessary to clean the air as scrupulously as the room surfaces. This is accomplished by running the HEPA filter fan units long enough for airborne asbestos to be cleaned out of the air.

● Visual inspection:

Before the application of any sealer to abated surfaces as a lock back there should be a visual inspection to determine if all ACM including debris and residue has been removed. After this visual inspection is passed, lock-back sealants can be applied and the work area decontamination process can be initiated. Visual inspections of the work area should be

performed by both the contractor and project monitor at each step of the decontamination process. Sources for information on visual inspection include: the American Society for Testing and Material (ASTM) has published a standard for visual inspections (ASTM E1368), the EPA Purple Book describes visual inspections.

● Work Area Decontamination:

There are two decontamination scenarios. If the surfaces of the space may have been contaminated before the abatement by the

ACM in the space, or during the abatement process, then the decontamination needs to include cleaning of these sur-

faces. This is referred to below as a “Space Decontamination.” Normally a “Space Decontamination” will be performed after the removal of an ACM surfacing material. If the ACM is intact and the designer determines that it has not contaminated the space in which it is located, and if the abatement work can be conducted inside an enclosure without

contaminating the space; then only the interior of the enclosure needs to be decontaminated. This is referred to below as an “Enclosure Decontamination.” Removal of some of the intact ACM pipe installation in a boiler room is an example of a situation where an “Enclosure Decontamination” may be appropriate.

● Space Decontamination:

If it was determined that the space may have been contaminated prior to the start of abatement work, the decontamination must include all surfaces of the space itself in addition to the protective layers of polyethylene. If the abatement process was one that could result in asbestos contamination reaching building surfaces through leaks in the sheet plastic, the space should be decontaminated regardless of prior condition.

Secondary (Drop Cloth) Layer:

Decontamination of the work area starts with good housekeeping during the abatement work. As described previously a drop cloth is put down at the start of each day and is removed along with the day's debris at the end of the work shift. This prevents the work area from becoming badly contaminated. It is extremely difficult to clean an area once the sheet plastic is covered with debris and residue.

1st Cleaning of the Primary Layer:

This cleaning is intended to remove any contamination debris which has escaped the daily drop cloth layers. This layer is cleaned with wet cotton rags. The rags

should be dipped once into clean amended water, rung out, and folded. Each surface of the rag should be used once and the rag re-folded between each pass. A rag should never be dipped back in the cleaning water after it has been used. This procedure prevents the cleaning water from becoming contaminated and promotes removal rather than redistribution of the residue on the plastic. A HEPA vacuum may be useful for removing debris encountered during the cleanup. After the surfaces have passed a visual inspection verifying that all debris and residue has been removed from the sheet plastic, allow a waiting period that is long enough for the HEPA-filtered fan units operating in the work area to provide 96 air changes. This allows the HEPA filters to collect any re-entrained asbestos and allows the plastic to dry thoroughly. The HEPA-filtration devices cycle air through the space or filter re-circulated air thus reducing airborne fiber levels. The inlet into the HEPA-filtration devices should be moved periodically to ensure that all air in the work area is either re-circulated through the filters or replaced with outside air. If this is not done the very thin fibers

will remain airborne in the areas where there is inadequate circulation. This is one reason for a failure of work areas to clear by TEM after clearance by PCM. The wet cleaning of surfaces will within a fairly short time collect those fibers thick enough to settle out during the cleaning. These are the fibers normally detected by PCM (optical microscope). The thin fibers observable only by TEM must be collected by cleaning or replacing the air in which they are suspended.

2nd Cleaning of the Primary Layer:

Carried out in the same manner as the first. This cleaning is intended to remove any material that has settled on the plastic. If this is not done this settled material could be re-entrained during removal of the plastic. The sheet plastic may be sealed with an encapsulant at this point as a further precaution against re-entraining asbestos during plastic removal.

The Primary Barrier is immediately removed leaving only the critical barriers isolating the space from the balance of the building.

1st Cleaning of the Room Surfaces:

The surfaces of the room are now cleaned in the same manner used to clean the Primary Barrier. This part of the process is intended to remove any contamination of the space that may have existed prior to abatement or may have occurred during it.

After the surfaces have passed a visual inspection verifying that all debris and residue has been removed, allow another waiting a period that is long enough for the HEPA-filtered fan units operating in

the work area to provide 96 air changes. This allows the HEPA filters to collect any re-entrained asbestos and allows the room surfaces to dry thoroughly. HEPA-filtered fan units can be used to either cycle air through the space or to filter and clean the air within the space, in both cases reducing airborne fiber levels.

2nd Cleaning of the Room Surfaces: Carried out in the same manner.

After a visual inspection, again wait for a period of time long enough for the HEPA-filtered fan units operating in the work area to provide 96 air changes. This will normally allow sufficient time for room surfaces to dry and to reduce airborne fiber levels. If surfaces in the room are still wet after this period, allow additional time as necessary to allow surfaces to dry. Continue operation of HEPA-filtered fan units. Additional HEPA air filtration devices can be used to re-circulate air within the space and increase the air change rate to reduce the time for this step. This is generally acceptable as long as sufficient time elapses for all surfaces to thoroughly dry. There is nothing magical about the 96 air changes. This resulted from combining two historical procedures (multiplying a 24 hour settling period times the 4 air changes an hour in the Purple Book). As a rule-of-thumb the 96 air changes set forth above usually will result in passing TEM clearance sampling, if the final cleaning is done properly. The designer should give consideration to modifying this requirement if required by specifics of a project.

● Enclosure Decontamination:

When intact non-friable materials are worked on and it has been determined that the space has not been contaminated before start of the abatement work, the decontamination procedure is designed to prevent contamination of the space. This work consists of cleaning the inside of the abatement work area so that the containment structure and materials do not contaminate the surrounding space when

the containment system is removed. This requires the same steps as in Space Decontamination above except the cleaning of the room surfaces. This results in the following steps:

- Drop Cloth Layer
- 1st Clean Primary Layer
- 2nd Clean Primary Layer

● Visual Inspection:

When the area has been completely cleaned it is visually inspected to determine if it is free of all debris, dust or residue. The visual inspection passes only when there is no such material found, regardless of its source. If the room was dusty before the start of work the post abatement cleanings should have rendered it clean. The NIBS *Guide Specification*

calls for the visual inspection to be made by the contractor and then certified by the Project Administrator. This makes it clear that the contractor is responsible for the cleaning, and making sure that the cleaning is complete. This differs from the procedure in ASTM E1368 where the project monitor has responsibility for the visual inspection.

CLEARANCE SAMPLING

Aggressive Sampling: Consists of sweeping all surfaces in the work area with a jet of air from a leaf blower. The air in the space is then kept in motion with large slow moving fans throughout the clearance air sampling. This tends to keep large fibers (those visible with an optical microscope) suspended where they can be collected during sampling. In the absence of some air motion almost all the large fibers visible with an optical microscope

will settle out during the 24 hour period between the final cleaning and visual inspection. Keeping the air agitated increases the likelihood that residual air contamination will be detected by on-site optical microscopy (PCM), thus, avoiding the expense and delays of TEM analysis.

This is something of an acid test for the cleaning job. However, if the space has been cleaned well, it will normally pass

aggressive clearance air sampling.

There are several circumstances in which aggressive sampling should not be used. It is not appropriate where there was only a partial removal and asbestos-containing materials remain in the work area that could be disturbed, nor at the completion of O&M procedures, nor in any circumstance where there is no containment. Background air sampling absolutely should not be done with aggressive air sampling.

Clearance Air Sampling:

Following visual inspection the air in the work area is sampled to determine if airborne fiber counts meet the requirements of the contract documents. Exactly what this means will depend upon the analytical method specified for the samples.

The AHERA regulations require the use of Transmission Electron Microscopy (TEM)

for clearance of all but very small work areas in schools. There are no federal requirements to apply AHERA clearance methods to other building types. However, some state and local jurisdictions have adopted clearance requirements similar to AHERA and many practitioners in the asbestos control industry have adopted them as standard practice.

Clearance by phase contrast microscopy (PCM) is allowed by the AHERA regulation for clearance of school projects which disturb no more than 160 square feet of surfacing treatment or 260 linear feet of thermal system insulation. The most appropriate clearance method will depend on post-clearance facility use, owner liability orientation, and other factors. While TEM may be appropriate for a risk-adverse owner's facility that will be reoccupied, PCM, or even no particular clearance test at all, may be acceptable for an open structure immediately prior to demolition.

Phase Contrast Microscopy (PCM) Clearance:

PCM is the analytical tool most widely available for the quantification of fibers in air samples. It cannot distinguish asbestos from other fibers and cannot detect the extremely thin fibers typical of airborne asbestos in buildings. Recent work has shown that many airborne fibers generated during abatement activities will be too thin to be seen by an optical microscope (particularly if the work involves highly processed chrysotile). The use of PCM analysis for clearance is based on the assumption that either only large fibers (5

microns or greater in length and large enough to be seen by PCM) will be present or that thin fibers will always be accompanied by the thicker fibers that PCM can detect. Experience with projects cleared with both PCM and TEM analysis has shown that this is not generally the case. Frequently there are far more thin fibers than thick ones. Clearance Requirements as set forth in the AHERA regulation are as follows:

Secure a minimum of 5 samples within the

work area or a minimum of 1 per room whichever results in the larger number of samples.

Sample volume must be at least 1199 liters (L) to achieve a detection limit of 0.01 fibers/cubic centimeter.

All samples must be equal to or less than 0.01 fibers/cubic centimeter.

Advantages:

- Can be analyzed at the job site so that almost immediate turn around time is possible.

- Inexpensive - \$15-\$50 per sample
- Longest history as an analytical method and as such has the best statistical base of any method.

Disadvantages:

- Is not allowed by the AHERA regulations for school projects beyond a minimum size.
- Cannot differentiate asbestos fibers from other fibers.
- Cannot detect thin fibers which may predominate in post-abatement air samples.

Transmission Electron Microscopy (TEM) Clearance:

The TEM is the most rigorous analytical tool currently available to identify asbestos fibers in air samples. It can differentiate between asbestos and other fibers. It can also detect very thin fibers which would be invisible to either PCM or scanning electron microscope (SEM).

There are three analytical tests that can be performed to identify fibers during TEM analysis. These tests can identify asbestos fibers and distinguish them from other types of fibers, and can determine the specific type of asbestos.:

Morphology: Identifies the fiber as having the shape, size and visible characteristics of an asbestos fiber. In doing this the TEM is capable of resolving single fibers. By comparison PCM and SEM

analysis can only resolve relatively large bundles of fibers. If this were the only test available the TEM would essentially be the same as a PCM with better resolution. However several additional tests can be performed.

Energy Dispersive X-ray Analysis

(EDXA): When a material is scanned with an electron beam, such as that used in TEM, X-rays are generated. The energy level of the X-rays is dependent upon the elements reflecting the X-ray. Analysis of these X-rays can then determine the elemental composition of the material and the relative concentration of each element. This chemical analysis tells us if the fibers in question are asbestos fibers.

Selected Area Electron Diffraction

(SAED): When electrons pass through a material their path is bent or diffracted. The exact pattern produced (diffraction pattern) is unique to the crystalline structure of the material.

Clearance Requirement: The clearance procedure set forth in the AHERA regulation is widely used in the asbestos abatement industry. Aggressive sampling, where the work area is swept with a leaf blower and air is kept in circulation with fans during sample collection is included as part of the AHERA clearance protocol.

Secure a minimum of:

- 5 samples within the work area
- 5 samples outside the work area (at the source of makeup air)
- 1 Laboratory blank
- 1 Work area blank
- 1 Outside blank

Sample volume must be adequate to achieve an analytical sensitivity of 0.005 fibers/cubic centimeter.

Samples are analyzed and the work area cleared according to the following sequence:

- Work area samples are analyzed.
- If the arithmetic mean (average) of the fiber counts on the filters is below the background contamination typically found on sampling filters (70 structures/square millimeter) the area clears.
- If the arithmetic mean is above this level the laboratory and work area blanks are analyzed to determine if there was contamination due to procedures followed at the laboratory that prepared the sample cassettes or during sample collection in the field.

If these samples are above the background level the clearance samples are rejected, analysis ceases and new samples must be collected.

- If the laboratory and work area blanks pass the outside blank is analyzed. If it is above background levels (70 structures/square millimeter) the clearance samples are rejected.
- If the outside blank passes the outside samples are analyzed. The inside samples and the outside samples are compared using the Z-test. If the work area samples are statistically equivalent to, or cleaner than, the outside samples then the work area clears.

This somewhat prolonged procedure is designed to minimize the unnecessary analysis of samples. At any point in the testing sequence, the decision may be made to discontinue the test, reclean the work area, and re-test. This may be advisable rather than pursuing a test sequence which has little hope of achieving a positive result.

The National Institute for Standards and Technology (NIST) has a national voluntary laboratory accreditation program (NVLAP) for laboratories that perform TEM analysis for asbestos in air samples. The laboratory selected for sample analysis should be a participant in this NVLAP program.

Other TEM methodologies can be used for project clearance. However, the AHERA procedure is most widely understood and accepted by abatement contractors, and is

the least likely to cause controversy in the event of a clearance test failure. The simplest of these is to use the Yamate counting rules in lieu of the AHERA rules. The Yamate rules count asbestos structures less than 0.5 microns in length that are excluded in the AHERA rules. The use of indirect preparation samples has been suggested as useful and perhaps more sensitive for project clearance.

Advantages:

- Is required by the AHERA regulations for projects beyond a minimum size.
- Can differentiate asbestos fibers from

other fibers.

- Can detect thin fibers which may predominate in post-abatement air samples.
- Uniform and standard procedures exist as set forth in the AHERA regulation.

Disadvantages:

- Must be analyzed at an off-site laboratory. Turn around time may be long, typically ranging from a minimum of about 8 hours to as long as a week.
- Expensive - \$100-\$750 per sample.

● **Scanning Electron Microscopy (SEM):**

SEM is not supported by any uniform procedure for analysis. Primarily for this reason and for other technical reasons the AHERA regulation does not permit and the EPA does not recommend clearance sample analysis by SEM.

For these reasons SEM should not be used for clearance sample analysis.

PROJECT CLOSEOUT

Substantial Completion: The point in the project where the contractor is substantially finished with the work. The date of Substantial Completion is usually the basis for liquidated damages and the start of warranties. The project designer certifies Substantial Completion and attaches a Punch List of the odds and ends which the contractor must resolve before closing out his contract with the owner.

Substantial Completion is tied to clearance of the work area. This is the point at which the owner is able to gain access to the space to begin reconstruction or re-occupancy. The Punch List consists of deficiencies and damages that have nothing to do with safely re-occupying the space (water damage, encapsulant smears, damage to finishes).

Work Area Clearance: Typically

The Punch List: A list prepared by the project designer and the owner that

itemizes incomplete or deficient items that remain at substantial completion. This list should be formally transmitted to the contractor and made the basis for final payment.

Final Payment: The contracts between the owner and contractor and between the owner and designer are open until closed by the Final Payment. Final Payment depends upon completion of the following:

- **Punch List Completion:** The contractor completes all items on the Punch List and requests a close out inspection by the owner's representa-

tive. Upon certification of completion of all Punch List items the certified Punch List becomes one of the project closeout submittals.

- **Final Submittals:** The final submittals for the project must be submitted prior to or as a part of the request for final payment. These submittals include:
 - Waiver of Liens
 - Record drawings (if applicable)
 - Landfill receipts and waste manifests
 - Consent of Surety
 - Project Logs

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APPENDIX A

FEDERAL OCCUPATIONAL AND ENVIRONMENTAL REGULATIONS, STANDARDS AND GUIDELINES

This Appendix describes the principal federal regulations, standards and guidelines governing occupational and environmental exposures to asbestos, as of the date of this publication. A number of other federal occupational and environmental standards also apply to operations within the scope of this Manual and the reader should be familiar with those requirements as well. It is also important to note that state and local regulations may have requirements that differ from federal regulations and some may be more stringent than the federal regulations described in this Appendix.

THE OCCUPATIONAL SAFETY AND HEALTH ACT:

OSHA Asbestos in Construction Standard (29 CFR 1926.1101)	79
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OSHA Fire Protection and Prevention (1926.150)	99
OSHA Disposal of Waste Material (1926.252)	100
OSHA Lockout and Tagging of Circuits (1926.417)	100
OSHA Scaffolding (1926.451)	101
OSHA Grounding for Protection of Employees (1926.954)	102

ENVIRONMENTAL PROTECTION AGENCY:

EPA Asbestos Hazard Emergency Response Act (AHERA)	103
EPA Asbestos School Hazard Abatement Reauthorization Act (ASHARA)	105
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THE OCCUPATIONAL SAFETY AND HEALTH ACT

The federal Occupational Safety and Health Act (OSH Act) is the primary source of regulation of an employer's obligation to provide a safe and healthful workplace. The OSH Act (1) requires that each employer comply with the occupational safety and health standards issued by OSHA; and (2), even in the absence of any specific standard, the Act also imposes a general duty on each employer to provide a workplace that is free from recognized hazards that are causing or are likely to cause death or serious physical harm to employees.

Public sector workers in states with their own OSHA programs can have standards equal to or more stringent than OSHA. The EPA "Asbestos Abatement Projects: Worker Protection Rule," (40 CFR 763, Sub-part G) extends similar protection to publicly employed workers involved in asbestos abatement work. For schools, the AHERA regulation (40 CFR 763, Sub-part E) sets forth training requirements for abatement, custodial and O&M workers and describes work practices for O&M work. The Asbestos in Schools Hazard Abatement Re-authorization Act (ASHARA) regulation extended these training requirements to all public and commercial buildings.

OSHA has developed three specific standards governing exposure to asbestos in the workplace: the construction standard, the shipyard standard, and the general industry standard. In addition to these, this Appendix also briefly describes other OSHA standards of more general applicability, as well as EPA and DOT regulations that apply to asbestos.

Major revisions to asbestos-specific standards were published in the Federal Register on August 10, 1994, and additional changes were published on June 29, July 13, and September 29, 1995. In addition, OSHA has issued a compliance directive regarding these revisions, Instruction CPL 2-2.63 dated November 3, 1995. The discussion includes all changes made as of the date of publication. The reader should verify whether additional changes have been made as of the time of use.

OSHA

ASBESTOS IN CONSTRUCTION STANDARD

(29 CFR 1926.1101)

The new standard, 29 CFR 1926.1101, replaces the previous one, 29 CFR 1926.58.

Scope and application

Most activities within the scope of this Manual are subject to the asbestos in construction standard, which covers all construction activities performed by employees, regardless of the primary activity of the employer; see paragraph (a)(7) of the standard. For example, maintenance or removal of an asbestos-containing gasket, even if performed in an industrial plant, by the employer's own maintenance staff, is covered under the construction standard. 1926.1101 regulates asbestos exposure in all work as defined in 29 CFR 1910.12(b), including but not limited to the following:

- Demolition or salvage of structures where asbestos is present;
- Removal or encapsulation of materials containing asbestos;
- Construction, alteration, repair, maintenance, or renovation of structures, substrates, or portions

- thereof, that contain asbestos;
- Installation of products containing asbestos;
- Asbestos spill/emergency cleanup; and
- Transportation, disposal, storage, containment of and housekeeping activities involving asbestos or products containing asbestos, on the site or location at which construction activities are performed.
- Coverage under the OSHA standard is based on the nature of the work operation involving asbestos exposure.

Examples of work falling outside the scope of the construction standard are: general housekeeping in industrial and commercial operations where asbestos may be contacted but not disturbed, and brake and clutch repair (general industry standard); and asbestos-related activities in shipyards (shipyard standard).

Definitions

The OSHA standard should be consulted for a complete listing of definitions. The following are selected definitions useful for this summary, but no more inherently important for OSHA compliance than others.

Asbestos-containing material: The OSHA standard defines both asbestos-containing materials (ACM) and presumed asbestos-containing material (PACM). Thermal system insulation and surfacing material in buildings constructed no later

than 1980 are treated as ACM unless it is proven that they are not.

- **Asbestos-containing material (ACM):** means any material containing more than one percent asbestos.
- **Presumed Asbestos Containing Material:** means thermal system insulation (TSI) and surfacing material found in buildings constructed no later than 1980. The designation of a

material as "PACM" may be rebutted pursuant to paragraph (k)(5) of this section.

Asbestos work: The OSHA construction standard establishes four categories or classes of asbestos work.

- **Class I** asbestos work means activities involving the removal of thermal system insulation (TSI) and surfacing asbestos-containing material (ACM) or presumed asbestos-containing material (PACM) and includes picking up and bagging asbestos debris/dust during Class I work. (In general this involves work on friable materials.)
- **Class II** asbestos work means activities involving the removal of asbestos-containing material (ACM) that is not TSI or surfacing material and includes picking up and bagging asbestos debris/dust during Class II work. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics. (In general, this involves work on non-friable materials if the material is removed in a substantially intact state.)
- **Class III** asbestos work means repair and maintenance operations where ACM, including TSI and surfacing ACM and PACM may be disturbed and includes picking up and bagging asbestos debris/dust during Class III work. (This is O&M work that generates no more than a single disposal bag of waste filled only 1/3 to 1/2 full.)
- **Class IV** asbestos work means maintenance and custodial activities during which employees contact, but do not disturb, ACM or PACM. Class IV activities also include clean-up

work that takes place in an area after a Class I, II, or III job (including all clean-up and bagging of asbestos-containing waste) has been completed. Class IV clean-up encompasses precautionary measures to be taken to avoid exposures in the event there is residual dust/debris present in the work area. In the event that residual dust or debris is found in the Class IV work area, a competent person must assess the area and decide whether the clean-up work should be performed as a Class I, II, or III operation. Class IV requires only awareness training. However, the EPA Model Accreditation Program requires accredited abatement workers for Class I and II clean-up where the work has made the material friable. All workers in a Class I, II or III work area should have the training required for that class of work. Workers should wear respirators if cleaning up a regulated area where respirators are required.

Some asbestos related work does not fall within a class; examples include encapsulation (a)(2) and installation of ACM (a)(4), but are covered by certain provisions of the standards.

Disturbance: means activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. Disturbance includes cutting away small amounts of ACM and PACM, no greater than the amount which can be contained in one standard sized glove bag or waste bag in order to access a building component. In no event shall the amount of ACM or PACM so disturbed exceed that which can be contained in one glove bag or waste bag which shall not exceed 60 inches in length and width.

Multi-employer worksites

On multi-employer worksites, the employer (abatement contractor) involved in Class I, II or III asbestos control work is required to

- notify other employers of the nature of work being performed and requirements for regulated areas,
- abate any asbestos contamination caused by their work.

Other employers on the site (such as other contractors including the General Contractor) are responsible for

- protecting their workers in accordance

with OSHA requirements, and

- ascertaining the integrity of the abatement contractor's enclosure and effectiveness of the control methods being used.

A general contractor on a construction project which includes abatement work is considered to have general supervisory authority over the abatement work even if not qualified to serve as the asbestos "competent person," and must require the abatement contractor to come into compliance with the OSHA standard when necessary.

Regulated areas

A regulated area is required for all Class I, II and III work, any area where waste and debris for asbestos work is accumulated, and any adjoining area where the PEL may be exceeded. See the section in this appendix on "Requirements for Individual Classes of Work" for discussions on regulated areas for different classes of work.

- The regulated area must be demarcated,
- access to the area must be limited to authorized persons,

- respirators must be used if required,
- certain activities are prohibited (eating, drinking, smoking, chewing tobacco or gum, and applying cosmetics^a), and
- a competent person must supervise work performed in the area.

a. In a January 13, 1995 memo from the Director of Directorate of Compliance Programs to Regional Administrators, OSHA has stated that it will not issue citations for "eating, drinking, chewing tobacco or gum, and applying cosmetics in a regulated area unless worker exposure exceeds the PEL."

Permissible exposure limits (PELs)

The OSHA regulation sets two permissible exposure limits (PELs) expressed in fibers per cubic centimeter (f/cc).

The Permissible Exposure Limits (PELs) are

- 0.1 f/cc based upon the average exposure for a complete 8 hour work shift, referred to as the 8 hour Time Weighted Average (TWA).
- The Excursion Limit (EL) of 1.0 f/cc is

for a 30 minute TWA, to address peak exposures a worker may experience.

In addition to requirements which apply at any exposure level, a number of requirements are triggered if either the PEL or EL are exceeded including ones for respiratory protection and protective clothing and a regulated area (See discussion above on regulated areas).

OSHA uses, "exceeding the PEL," or, "exceeding the PELs," to mean,

“exceeding either the 8-hour permissible exposure limit (PEL) or the excursion limit (EL).”

OSHA requires controls based on the kind

of operation regardless of the measures exposure levels.

Requirements at any Exposure Level

The following provisions apply to any activity covered under the standard, regardless of measured exposure levels.

General

- Exposure assessments and monitoring (f):
 - Initial exposure assessment by a "competent Person" (f)(2). (See below for competent person requirements and duties.)
 - Negative exposure assessments (NEA) can be obtained from the initial assessment, objective data, or historical data taken by the employer on previous jobs within the past twelve months, under conditions closely resembling the current work, and which provide a high degree of certainty that neither the time weighted average (TWA) nor the excursion limit (EL) will be exceeded (f)(2)(iii). A special NEA rule for removals of resilient flooring is explained in flooring section under Class II activities. Relevant historic data factors include: processes, type and condition of material, work practices used, and the level of training and experience of the workers.
 - Additional monitoring needed when work changes or other reason new or additional exposures above a PEL may occur.
 - Employees and their representatives can observe monitoring (f)(6).
 - Employer must notify employee of monitoring results(f)(5).

- Multi-employer worksites (d):
 - Employers establishing regulated areas must tell other employers on the site of the nature of the asbestos work, regulated area requirements, and control measures used (d)(1).
 - Breaches and hazards are the responsibility of the employer who created or controls the contamination (d)(2).
 - All employers must take applicable protective measures, e.g., relocation, even if they did not cause the exposure (d)(3).
 - Employers with workers next to the regulated area of another employer must check controls' effectiveness daily (d)(4).
 - General contractors must ensure that all subcontractors comply with the standard (d)(5).

Controls

- Engineering controls and work practices must include (g)(1):
 - HEPA vacuums(except for some roofing operations; see below under Class II).
 - Wet methods (except where infeasible or create a safety hazard; or for certain removal of roofing or resilient flooring [see Class II discussions, below]).
 - Prompt clean-up and disposal.
- Prohibited work practices and

engineering controls (g)(3):

- High-speed abrasive disc saws.
- Compressed air to remove asbestos (unless in enclosed ventilation system).
- Dry sweeping or shoveling.
- Employee rotation to reduce exposure.
- When vacuuming is used for housekeeping on construction projects, HEPA vacuums must be used; and used and emptied so as to minimize asbestos dispersal (l)(1).
- Waste, debris and accompanying dust in an area with accessible TSI or surfacing ACM/PACM or visibly deteriorated ACM shall be promptly cleaned up using wet dusting or sweeping, or HEPA vacuuming, and disposed of in leak tight containers (I)(4) (see Class II discussion of roofing operations).
- Medical monitoring (m):
 - Medical surveillance is required for workers engaged in Class I, II or III work, or exposed at or above the PEL, for a combined total of 30 or more days a year (any day in which a worker engages in Class II or III operations or a combination thereof on intact material for one hour or less, including removal and cleanup, and fully adheres to the work practices in the standard, shall not be counted). Medical examinations' frequency, content, and information given to and by the physician shall follow the standard. A medical examination is also required before a worker may be assigned to any job where a respirator is required (h)(3)(iv) and 29 CFR 1926.103. The General Industry standard requires medical monitoring for any employee exposed at or above the PEL on any day.
 - Employers shall ensure that employees required to wear a

negative pressure respirator are determined, at no cost to them, and under the supervision of a physician, to be physically able to perform the work and use the respirator (h)(3)(iv) and (m)(1)(I)(B).

- Procedures are specified for: 1. resilient flooring maintenance in connection with construction work (l)(3), and 2. dust and debris cleanup in areas containing accessible thermal system insulation or surfacing ACM/PACM or visibly deteriorated ACM (l)(4).

Identification of Materials

- Building/facility owner (which includes a lessee) must determine the presence, location and quantity of ACM and/or presumed asbestos-containing materials (PACM) at the work site before beginning any work subject to the standard (k)(2)(I).
- Presume or inspect surfacing, thermal system insulation (TSI), or resilient flooring material at work site (k)(1):
 - TSI and sprayed-on or troweled-on surfacing materials in buildings or substrates constructed before 1980 are PACM; resilient flooring material installed before 1980 is also presumed to be ACM, although the term "PACM" is not used for it (k). Can rebut presumptions:
 - For PACM, an AHERA inspection, or testing of the material being worked on by an AHERA-accredited inspector or a Certified Industrial Hygienist, is required; a nationally recognized testing program (National Voluntary Laboratory Accreditation Program [NVLAP] or equivalent) must be used for analysis (k)(5)(ii).
 - For resilient flooring material, an industrial hygienist must use recognized analytical techniques

(k)(5)(iii).

Communication

- The building/facility owner must notify, in writing or personally, the presence, location and quantity of ACM or PACM at the work sites to (k)(2)(ii):
 - Prospective employers whose employees will work in or next to areas with ACM or PACM.
 - Owner's employees who will work in or next to such areas.
 - All employers on multi-employer worksites whose employees will work in or next to such areas.
 - Tenants who will occupy such areas.
- Before work begins, the employer must inform the building/facility owner, its own employees, and other employers whose employees will work in or next to the area, of the presence, location and quantity of ACM and/or PACM, and precautions to be used (k)(3)(ii). For work within a regulated area, the employer must also inform other employers of the nature of the work and regulated area requirements (d)(1).
- The employer shall, if asked, make available for examination and copying:
 - All records required to be maintained, to OSHA and NIOSH;
 - all required exposure records, to affected current and former employees, their designated representatives, and OSHA; and
 - required employee medical records, to the employee, and person with the employee's written consent, and OSHA (n)(7).
- By 10 days after completion of work, the employer must inform the building/facility owner, its employees, and other employers whose employees work or will work in the area, of the

current location and quantity of PACM and/or ACM remaining, and any final monitoring results (k)(3)(iii).

- Within 24 hours of discovery, the employer must inform the building/facility owner and other employers whose employees work in the area, of the presence, location and quantity of newly discovered ACM and/or PACM (k)(4).
- The employer and building/facility owner must identify PACM as ACM in communications to employees, and treat as ACM materials they know or should have known through the exercise of due diligence to be ACM (k)(1).

Warning Signs and Labels

- Signs at entrance to regulated areas (k)(7).
- Signs at entrance to mechanical rooms/areas with ACM or PACM (k)(6). Signs can be on outside of entrance or inside room if visible to people entering (Compliance Directive, p. C-36).
- Labels must be placed on products containing asbestos, including waste containers and, where feasible, installed products, unless asbestos fibers are bound so that no foreseeable work will release them above PEL or EL, or when less than 1% (k)(8).
- Employers/building owners must post or affix signs or labels with respect to all ACM or PACM (k)(8)(vii). Signs required by (k)(6) may be posted in lieu of labels so long as they contain information required for labeling.
- Signs and labels must be comprehensible to non-English speaking employees (k)(7).

Training

- Employers must train employees in recognizing and avoiding unsafe

conditions, applicable regulations, the potential hazards, safe handling and use of harmful or toxic substances, and personal hygiene and personal protective measures required (29 CFR 1926.21(b)).

- Employers must train all employees doing Class I-IV work, and asbestos product installers, before or at initial assignment and then at least annually (k)(9)(I)-(ii).
- Any training done must be in a manner employee is able to understand (e.g., language) and must take place with a knowledgeable instructor present (k)(9)(viii).
- Employer must make readily available at no cost to employees, written materials on the employee training program, and inform them about, and provide if asked, approved self-help smoking cessation program material; and give OSHA and NIOSH all employee information and training program materials if asked (k)(10).
- Minimum training requirements for each Class are outlined later in this appendix.

Record Retention

- Exposure monitoring records, including those for a negative exposure assessment (NEA) based on current or historical data: 30 years (n)(2). Records based on objective data; while employer relies on data (n)(1). Exposure measurements may be kept by either the employer or competent organizations, e.g., trade or employee groups (n)(2).

- Medical surveillance records: Employment plus 30 years (n)(3).
- Training records: Employment plus one year (n)(4).
- Data to rebut PACM: While employer relies on data (n)(5).
- Notifications received and communicated about ACM and PACM, and their content, must be maintained by the building/facility owner and transferred to its successive owners (n)(6).
- The employer must meet the record transfer rules of 29 CFR 1910.20(h); if it stops doing business without a successor employer to keep the records as required, it must tell NIOSH at least 90 days before disposal and send the records to NIOSH if asked (n)(8).

Competent Person

- The employer must have a "competent person" able to identify asbestos and other hazards and unsanitary or dangerous conditions, and select control strategies, and with the authority to take prompt corrective measures to eliminate hazards (o)(1). The competent person may be the employer, an employee, or a contractor of the employer.
- The competent person must inspect the job site, materials and equipment frequently and regularly (o)(2).
- The competent person must have training specific to the class of asbestos project (o)(4).

Requirements When Asbestos Levels Exceed TWA (0.1 f/cc) or EL (1.0 f/cc)

- All items required at any asbestos level.
- Regulated area (e)(1).
 - Signs at regulated areas, even if below PELs (k)(7).
- Periodic monitoring when expect to exceed a PEL, with exceptions for employees in some supplied-air or positive pressure respirators (f)(3)(ii).
- Additional engineering controls and work practices to get to or below the PELs (g)(2):
 - Local exhaust ventilation with HEPA filters.
 - Enclosure or isolation.
 - Directed make-up air with HEPA filter exhaust.
- Other feasible engineering and work practices controls.
- Respiratory protection (h), with minimum types used (h)(2) and Table 1, and respiratory protection program (h)(3)-(4).
- Protective clothing provided when over a PEL or, when required, a negative exposure assessment (NEA) not produced (I)(1). Inspect for rips or tears (I)(4). Laundering allowed under certain conditions (I)(2).
- Additional training for all employees likely to be exposed above a PEL, before or at initial assignment and then at least annually using applicable Class I-IV curriculum, or else (k)(9)(viii) curriculum(k)(9)(I), (ii), (vii).

Class I Activities

Activities involving removal of TSI or surfacing ACM or PACM. Large Class I jobs, those involving removal of over 25 linear or 10 square feet of TSI or surfacing material, have additional requirements.

General

- All items required at any asbestos level.
- Regulated area (e), with warning signs (k)(7).
- Presumption of exposure in excess of a PEL unless an NEA is produced (f)(2)(ii).
- Daily monitoring, unless an NEA is produced, or employees use a control method in (g)(4)(I)-(iii) with supplied-air respirators operated in pressure demand mode or other positive pressure mode respirator (f)(3).
- All work supervised by competent person (g)(4)(I).
- AHERA abatement worker training (four days) (k)(8)(iii).
- Medical surveillance; see description above (m).
- The competent person must:
 - Inspect the site at least once per work shift and at any time at employee request (o)(3).
 - Do or supervise specified control duties (o)(3)(I).
 - Currently be accredited from an AHERA supervisor's course (five days), or an equivalent (o)(4)(I).

Controls

- Additional controls and work practices for large Class I jobs; for small Class I jobs, where an NEA has not been produced; or for work adjacent to a regulated area (g)(4):

- Critical barriers or other measures to isolate area (g)(4)(ii).
- HVAC system isolation (g)(4)(iii).
- Impermeable dropcloths (g)(4)(iv)-(v).
- Directed make-up air if no NEA or over PEL (g)(4)(vi).
- At least one of these control methods, as applicable (g)(5):
 - Negative pressure enclosures (g)(5)(I).
 - Glove bag. Do not move or reuse bag; use at least two persons for Class I work (g)(5)(ii).
 - Glovebags used on elbows and other connections must be specifically designed for such use (g)(5)(ii)(A)(2).
 - Negative pressure glove bag system (g)(5)(iii).
 - Negative pressure glove box system (g)(5)(iv).
 - Water spray process system (g)(5)(v).
 - Mini-enclosure (g)(5)(vi).
- Supplied Air Respirators, unless 8-hr. TWA below 1 f/cc, then tight-fitting powered air purifying respirators (PAPRs) (h)(1) and (h)(2)(v)
- Protective clothing for large jobs, or as otherwise required (I)(1).
- Hygiene facilities and practices (j).
 - Large jobs: Equipment room; shower area; clean change room; lunch areas; decontamination of workers, equipment and containers (j)(1).
 - Small jobs: Equipment room, decontamination of workers, equipment, and containers (j)(2).
- Alternative controls may be used (g)(6). To do so, a Certified Industrial Hygienist or licensed Professional Engineer who is an AHERA project designer must evaluate the planned work based on data for worst-case conditions and equivalent employee training and experience, and certify the planned controls as adequate (g)(6)(ii); a competent person may evaluate and certify small jobs (g)(6)(ii)(A). OSHA must be notified in advance for large jobs (g)(6)(iii).

Class II Activities

Activities involving removal of ACM which is not TSI or surfacing material. This includes, but is not limited to, the removal of asbestos containing wallboard, floor tile and sheeting, roofing, and siding shingles and construction mastics.

General

- All items required at any asbestos level.
- Regulated area (e), with warning signs (k)(7).
- Daily monitoring, unless an NEA is produced, or employees use supplied-air respirators operated in pressure demand mode or other positive pressure mode respirator (f)(3).
- All work supervised by competent person (g)(7)(I).
- AHERA abatement worker training, unless working with only one generic category of building material, then job-specific training (8 hours for roofing, flooring, siding, ceiling tile, or transit panel work) based on (k)(9)(viii) curriculum and specific relevant work practices and engineering controls (g), with hands-on training (k)(9)(iv). (See

below for training on roofing and resilient flooring removal.)

- Medical surveillance; see description above (m).
- The competent person must:
 - Inspect sufficiently to assess whether conditions have changed, and at reasonable time upon employee request (o)(3).
 - Do or supervise specified control duties (g)(7)(I), (o)(3)(I).
 - Currently be accredited from an AHERA supervisor's course (five days), or an equivalent (o)(4)(I).
- Special rules for resilient flooring removals and roofing work (see below).

Controls

- Critical barriers, or other isolation method required if: (1) no NEA; (2) TWA/EL exceeded; or (3) material is not removed intact (g)(7)(ii).
- Impermeable drop cloths beneath all removal activity, except removal of flooring or roofing material from a solid substrate underneath the material (g)(7)(iii).
- Equipment room or area covered by impermeable drop cloth for entry and decontamination when exceed a PEL or no NEA produced (j)(2).
- Work practices set forth in (g)(1).
- Respiratory protection where ACM not removed in substantially intact state, wet methods not used (except for intact removal of sloped roofing ACM with an NEA, or certain non-wet removal of intact resilient flooring material using heat, see below), no NEA produced, a PEL exceeded, or in an emergency (h)(1). An employer must inform employees that a tight-fitting PAPR must be provided in lieu of a negative pressure respirator, at the employee's request (h)(2)(iii)(B).

- Hygiene facilities and practices where a PEL is exceeded or no NEA produced: equipment room, decontamination of workers, equipment, and containers (j)(2).
- Additional controls and practices, as applicable (g)(8):
 - Glove bag or glove box, only if fully enclose the material to be removed (g)(8).
 - Vinyl and asphalt flooring material (g)(8)(I).
 - Roofing material (g)(8)(ii).
 - Cementitious siding or shingle, or Transite panel (g)(8)(iii).
 - Gasket (g)(8)(iv).
 - For other Class II materials: use wet methods; remove intact if feasible; no cutting, abrading or breaking (unless nothing better); wrap or bag debris (g)(8)(v).
- Alternative controls may be used (g)(8)(vi). To do so, a competent person must evaluate the planned work under all expected conditions, based on data for closely similar conditions and equivalent employee training and experience, and certify the planned control method as adequate (g)(8)(vi)(A), (B).
- Rules Unique to Intact Removal of Resilient Flooring
 - NEA may be based on data in OSHA rulemaking record when all three criteria are met: (1) only those work practices for flooring removal referred to as "compliant work practices" in OSHA Compliance Directive C.P.L. 2-2.63, at D-34 to D-36 (Nov 3, 1995) ("OSHA Compliance Directive"), as implemented in WP R-1A and R-2A of this Manual, are used; (2) all workers have completed the required 8-hour intact resilient floor covering removal training course (Compliance Directive at D-50 to D-52); and (3) prior to the removal,

a competent person assesses the job and determines that the flooring is intact and likely to remain intact throughout the removal process.

- "Intact" means that flooring material has not crumbled, been pulverized, or otherwise deteriorated so that it is no longer likely to be bound with its matrix. Incidental breakage or slicing of flooring material when using work practices specified above does not mean that the material is non-intact.
- Competent persons supervising intact flooring removal operations only must have the 8-hour worker training course, plus four hours of supervisory training (Compliance Directive at D-53 to D-54).
- Respirators not required if material removed intact, even if heat is used along with other compliant work practices and wet methods are not. (Note: respirators may be needed for reasons other than asbestos. For example, if tiles are overheated, harmful fumes might be released and a respirator with organic vapor cartridges might be needed.)
- Caution: If the material is not removed intact, additional protections, such as critical barriers, respirators, and additional training for employees and competent persons is required before work can continue (See OSHA Compliance Directive at D-40 Paragraph 3 and D-44 Paragraph 10). Mechanical chipping is prohibited unless performed in a negative exposure enclosure (g)(8)(I)(F).
- For employers who remove 'intact' flooring materials using compliant work practices, the requirement to notify employers of employees who work on adjacent areas (k)(3)(ii)(B) applies only to employers of employees who, during removal of flooring material, work in areas not separated from the work area by an

impermeable barrier, which may include a wall, closed door or window.

- Rules Unique to Removal/Repair of Asbestos-Containing Roofing:

- Remove intact to extent feasible. Isolate roof level heating and ventilation air intake sources or shut down ventilation system (g)(8)(ii)(A),(G).
- Wet methods: Remove roofing wet if it is or will become non-intact, unless wet methods infeasible or will create safety hazards (g)(8)(ii)(B). Wear respirators if wet methods not used, except for intact removal of sloped roof ACM with an NEA (h)(1)(iii). Continuously mist cutting machines, unless it substantially decreases worker safety (g)(8)(ii)(C). (See below for small scale work.)
- To remove built-up roofs with asbestos-containing roofing felts using a power roof cutter: For aggregate or smooth surface, collect resulting dust by a HEPA dust collector or HEPA vacuuming; for smooth surface, resulting dust may also be collected by gently sweeping and then carefully and completely wipe up all the still-wet dust and debris, Immediately bag dust and debris or place in covered containers (g)(8)(ii)(D). (See below for small scale work.)
- Wastes: Carry or pass roofing to the ground by hand, or lower it via covered, dust-tight chute, crane or hoist; do not drop or throw it to the ground. Lower ACM to the ground as soon as practicable during the work shift. While non-intact removed ACM is on the roof, keep it wet, in an impermeable waste bag, or wrapped in plastic sheeting. Transfer unwrapped ACM to a closed receptacle upon its being lowered to the ground, precluding

dust dispersion (g)(8)(ii)(E),(F).

- Small scale work exception: Wet methods or HEPA vacuuming not required when remove or repair under 25 square feet of an intact roof on one day by manual methods which do not render the material non-intact or create visible dust (g)(8)(H).

Alternative methods for intact installation, removal (Class II), and repair and maintenance (Class III) (g)(11):

- Employer may use these methods; if employer does not, or material does not remain intact, general control provisions (g)(8) apply (g)(11).
- Competent person inspects worksite before work and as needed during job to determine if roofing is intact

and will likely remain so (g)(11)(I).

- Train employees using (k)(9)(viii) curriculum (g)(11)(ii).
- Use manual methods which do not render roofing non-intact. Do not sand, abrade, or grind roofing (g)(11)(iii).
- Carry or pass roofing to the ground by hand, or lower it via covered, dust-tight chute, crane or hoist; do not drop or throw it to the ground. Lower ACM to the ground as soon as practicable during the work shift (g)(11)(iv).
- Employer notifies building owner of presence and location of AC roofing products installed on non-residential roofs by end of job (g)(11)(v).

Class III Activities

Repair and maintenance operation where ACM, including TSI and surfacing ACM and PACM, is likely to be disturbed, limited in size to amounts that can be contained in a standard size glove or waste bag.

General

- All items required at any asbestos level.
- Regulated area (e), with signs (k)(7).
- Periodic monitoring when expect to exceed a PEL (f)(3)(ii).
- AHERA operations and maintenance course or equivalent (16 hours), unless it does not cover the training needed for the specific work, in which case, train on (k)(9)(viii) curriculum and specific relevant work practices and engineering controls (g), with hands on training (k)(9)(v).
- Medical surveillance; see description above (m).
- Glove bag, mini-enclosure or other

isolation method required if TSI or surfacing is cut, drilled, sawed, sanded abraded, chipped, or broken (g)(9)(iii).

- The competent person must:
 - Inspect sufficiently to assess whether conditions have changed, and at any reasonable time upon employee request (o)(3).
 - Currently be accredited in an AHERA operations and maintenance course (16 hours), or an equivalent; or the supervisor course (o)(4)(ii).
- See discussion of roofing repair and maintenance in Class II text, above.

Controls

- Control include wet methods; local

exhaust ventilation where feasible; impermeable drop cloths, and mini-enclosures or glove bags when drilling, cutting, abrading, sanding, chipping, breaking.

- Impermeable drop cloths and mini-enclosure, glove bag, or other isolation method, when drilling, cutting, abrading, sanding, chipping, breaking or sawing TSI or surfacing (g)(9)(iii).
- On all other Class III operations, use impermeable dropcloths and plastic barriers, or glove bag, etc., if no NEA or if PEL is exceeded.
- Respiratory protection where wet methods are not used, except for intact

removal of sloped roofing ACM with an NEA; NEA not produced; TSI or surfacing ACM or PACM being disturbed; a PEL exceeded; or in an emergency (h). An employer must provide an employee with a tight-fitting PAPR, in lieu of a negative pressure respirator, at the employee's request.

- Hygiene facilities and practices, where exposures exceed a PEL, or no NEA produced: Equipment room; decontamination of workers, equipment, and containers (j)(2).

Class IV Activities

Maintenance and custodial activities during which employees contact but do not disturb ACM or PACM, and activities to clean up waste and debris resulting from Class I, II, and III activities.

General

- All items required at any asbestos level.
- Periodic monitoring when expect to exceed a PEL (f)(3)(ii).
- EPA awareness training course for maintenance and custodial workers or equivalent (2 hours) (k)(9)(vi). EPA does not consider 2-hour awareness training adequate for Class IV workers cleaning up dust, waste and debris from Class I, II and III work. These workers should receive the training appropriate for the Class of work involved.
Caution to employers: do not allow workers with only two hrs training to disturb asbestos.
- Assume waste and debris in areas with accessible friable TSI or surfacing materials contain asbestos (g)(10)(ii); assume dust in close proximity to deteriorated ACM also is ACM (C.P.L. 2-2.63 at C-18).

- The competent person must:

- Inspect sufficiently to assess whether conditions have changed, and at any reasonable time upon employee request (o)(3).
- Currently be accredited in an AHERA operations and maintenance course (16 hours), or an equivalent; or the supervisor course (o)(4)(ii).

Controls

- Controls include wet methods, HEPA vacuums, prompt clean up of debris containing ACM or PACM (g)(10).
- Respiratory protection where Class IV work done in regulated areas where other work requires respirators; a PEL exceeded; or in an emergency (g)(10)(I), (h)(1).
- Hygiene facilities and practices:
 - When in regulated area, same as for

other work (j)(3).

- When cleaning up TSI or surfacing ACM or PACM debris and material,

provide (j)(2) decontamination facilities (j)(3).

Minimum Training Requirements

29 CFR 1926.1101

Training is the employer's responsibility, and must be provided (k)(9)(I)-(ii):

- at the employer's expense;

- prior to initial assignment; and
- at least annually thereafter.

Workers

Class I:

32 hr. EPA/AHERA (k)(9)(iii)

Class II:

- all asbestos-containing materials, except surfacing and TSI
 - if work requires critical barriers, equivalent isolation or a negative pressure enclosure, then 32 hr. EPA/AHERA abatement worker training is required.
- roofing, flooring, siding ceiling tiles, transite panels: 8 hr. minimum training time for each category of material, covering (k)(9)(iv):
 - all (k)(9)(viii) elements;
 - all applicable paragraph (g) elements
 - The minimum curriculum for intact resilient flooring removal training course is set forth in OSHA Compliance directive at D-50 to D-52.
 - "hands-on" training
- other miscellaneous materials: at least four hours for each category of material, but covering:
 - all (k)(9)(viii) elements;
 - all applicable paragraph (g) elements
 - "hands-on" training
 - If Class II materials are friable or become friable during removal, EPA requires the full 32 hour worker training course.

Class III:

16 hr. EPA/AHERA O&M course (k)(9)(v)

Exception: where competent person deems such training inadequate, and then training must include for each category of material worked with:

- all (k)(9)(viii) elements;
- all applicable paragraph (g) elements
- "hands-on" training

Class IV:

2 hr. EPA/AHERA Awareness Training Course or equivalent (k)(9)(vi)

Other Workers:

- exposed at any level, even below PEL:
 - General Safety training (29 CFR 1926.21) and hazard communication (hazcom) training (29 CFR 1926.59)
- Employees likely to be exposed above PEL (k)(9)(vii):
 - training to include all (k)(9)(viii) elements.
- EPA does not consider 2 hours of awareness training as adequate for workers cleaning up dust, waste and debris from Class I, II or III work. Workers involved in these activities should have the training appropriate to the class of work involved.

Competent Persons

Class I and II:

40 hr. EPA/AHERA supervisor training course (o)(4)(I)

Exception:

Class II intact¹, resilient flooring removal operations: 4 hr. supervisor course supplemental to basic 8 hr. worker training course

Class III and IV:

16 hr. EPA/AHERA O&M Worker Training Course or 40 hr. EPA/AHERA supervisor training course. (o)(4)(ii). The competent person for Class IV work involving clean-up of dust, waste and debris from Class I, II or III activities should have 40 hr. EPA/AHERA supervisor training course.

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1. These operations are described as non-aggressive in the NIBS Model Guide Specifications.

OSHA

ASBESTOS IN GENERAL INDUSTRY STANDARD

(1910.1001):

Scope of coverage

The industry standard covers employee exposure to asbestos in a wide variety of industrial and commercial settings where the employee is not engaged in construction activity. For example, this standard covers:

- General housekeeping involving

asbestos containing material in industrial and commercial facilities unless such housekeeping occurs during or after construction activities.

- Repair and replacement of automotive brakes and clutches.

General

- Exposure, Assessments and Monitoring

- Initial monitoring of employees who are, or may reasonably be expected to be, exposed to the time-weighted average (TWA) of 0.1 f/cc or the excursion limit (EL) of 1 f/cc (30 minute average) unless data generated after March 31, 1992 or objective data show that the TWA and EL will not be exceeded.
- Periodic monitoring required unless initial monitoring, if required, or periodic monitoring statistically indicates that the employee exposures are below the TWA or EL.
- Additional monitoring needed when work changes or the other reason may cause new or additional exposures above the TWA or EL.
- Employer must notify employee of monitoring results.

- General controls

- Use wet methods insofar as practicable.
- Compressed air to remove asbestos

is prohibited (unless in enclosed ventilation systems).

- Employee rotation to reduce exposure is prohibited.
- When vacuuming asbestos containing waste and debris, HEPA vacuums are required and must be used so as to minimize asbestos dispersal.
- Dry sweeping and shoveling only where vacuuming and/or wet cleaning are not feasible.
- Asbestos waste must be sealed in impermeable labeled bags or containers so as to minimize asbestos dispersal.

- Controls for Care of Asbestos Containing Flooring

- Sanding is prohibited.
- Stripping of finishes must use low abrasion pads at speeds lower than 300 rpm and wet methods.
- Burnishing or dry buffing may be used only on floors with sufficient finish so that pad does not contact ACM.

Identification of Materials and Communication

- Building/facility owner (which includes a lessee) must inform employers of employees, and employers must inform employees, who perform housekeeping activities in areas which contain ACM and/or presumed asbestos-containing material (PACM) of the presence and location of ACM and PACM in such areas.
- Presume or inspect surfacing, thermal system insulation (TSI), or resilient flooring material in housekeeping area:
 - TSI and sprayed-on or troweled-on surfacing materials in buildings or substrates constructed before 1980 are PACM; resilient flooring material installed before 1980 is also presumed to be ACM, although the term “PACM” is not used for it.
- Can rebut presumptions:
 - For PACM, an AHERA inspection, or testing of the material being worked on by an AHERA-accredited inspector or a Certified Industrial Hygienist, is required; a nationally recognized testing program (National Voluntary Laboratory Accreditation Program (NVLAP) or equivalent) must be used for analysis.
 - For resilient flooring material, an industrial hygienist must use recognized analytical techniques.

Warning Labels

Labels must be placed on products containing asbestos, including waste containers and, where feasible, installed products, unless asbestos fibers are bound

so that no reasonably foreseeable work will release them above TWA or EL, or when less than 1%.

Training

- Employer at no cost to employee who performs housekeeping operations in areas which contain ACM or PACM must provide an asbestos awareness training course (2 hours) which covers (1) health effects of asbestos exposure; (2) location of ACM and PACM; (3) recognition of ACM and PACM damage; (4) housekeeping requirements; and (5) proper response to fiber release episodes.
- For employees exposed to asbestos at or above the TWA or excursion limit, the employer must provide more extensive training which covers (1) health effects of asbestos exposure; (2) smoking risks; (3) nature of asbestos operations that could result in asbestos exposure; (4) engineering controls and work practices; (5) respirators and protective clothing; (6) medical surveillance and (7) warning signs and labels.
- Record Retention
 - Exposure monitoring records: 30 years. Records based on objective data: while employer relies on data.
 - Medical surveillance records: Employment plus 30 years.
 - Training records: Employment plus one year.
 - Data to rebut PACM: While employer relies on data.

Requirements when Asbestos Levels Exceed TWA or Excursion Limit

- All items required above.
- Regulated areas, which includes demarcating the area from the rest of the workplace, limiting access to authorized personnel, and posting warning signs.
- Feasible engineering controls and work practices to reduce exposures to PEL and excursion limit and below.
- Respiratory protection which meets selection requirements and respiratory protection program.
- Protective clothing, including inspection for rips or tears. Laundering allowed under certain conditions.
- Hygiene facilities which include a change room, showers, and lunchroom facility.
- Medical surveillance which includes an annual medical examination whenever an employee is exposed at or above the PELs.
- Additional training.

OSHA Hazard Communication Standard (1926.59)

- The purpose is to ensure that the hazards of all chemicals produced or imported are evaluated, and information concerning their hazards is transmitted to employers and employees.
- The standard applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.
- Chemicals must be evaluated to determine if they are hazardous.
 - Chemical manufacturers and importers are required to perform evaluations on chemicals they produce or import.
 - Employers can rely on evaluations performed by manufacturers and/or importers, or they can choose to perform their own evaluation.
- Employers are required to develop, implement and maintain a written hazard communication program at the worksite. The written program must contain information addressing the following issues:
 - Labeling containers and other forms of warning.
 - Material safety data sheets.
 - Employee information and training.
 - A list of the hazardous chemicals known to be present at the worksite.
 - The methods the employer will use to inform employees of the hazards of non-routine tasks.

OSHA

Head Protection

(1926.100)

- Employees working in areas where there is a possible danger of head injury from falling or flying objects, or from electrical shock and burns, must be protected by protective helmets.
- Protective helmets must meet the specifications contained in ANSI Z89.1 (impact and penetration), or ANSI Z89.2 (electrical shock and burns).

OSHA

Hearing Protection

(1926.101)

Whenever it is not feasible to reduce noise levels below the levels specified in 29 CFR 1926.52, employees must be provided with, and use, adequate hearing protection.

OSHA

Eye and Face Protection

(1926.102)

- If the potential for eye or face injury exists, employees must be provided with eye and face protection. The potential for injury may come from physical, chemical or radiation agents.
- The eye and face protection must meet the requirements specified in ANSI Z87.1.

OSHA

Respiratory Protection

(1926.103)

The standard contains some general requirements for respiratory protection. 29 CFR 1926.1101 contains some specific requirements for respirator use during construction activities involving asbestos. The requirements of 1926.1101 should be

followed, with 1926.103 (or other specific standards, such as 1926.62, for lead) being referenced for issues not covered by 1926.1101.

OSHA

Safety Belts, Lifelines, and Lanyards

(1926.104)

- Safety belts, lifelines and lanyards can only be used for employee safeguarding. A device must be immediately removed from service after being subjected to a service load.
- Specifications for safety belts, lifelines and lanyards are given in the standard.

OSHA

Fire Protection and Prevention

(1926.150)

Fire protection and prevention standards are contained in Subpart F of 29 CFR 1926.

Fire Protection (1926.150)

- The employer must develop a fire protection program, which must be followed throughout all phases of the project. The program should ensure:
 - There is no delay in providing the necessary firefighting equipment.
 - Access to the equipment is maintained at all times.
 - Firefighting equipment will be conspicuously located.
 - Firefighting equipment will be periodically inspected and maintained in operating condition.
 - If warranted by the project, a trained and equipped fire brigade will be provided by the employer.
 - A temporary or permanent water supply, sufficient for the firefighting equipment will be provided.
- Portable firefighting equipment will be provided as follows:
 - Portable fire extinguishers, or acceptable substitutes must be provided for each worksite as specified in the standard.
 - Portable fire extinguishers shall be inspected periodically and maintained in accordance with NFPA No. 10A-1970.
 - Acceptable fire hoses with appropriate connections may be substituted for fire extinguishers as specified in the standard.
- Fixed firefighting equipment shall be maintained operational as long as possible during demolition projects.
- Employers shall establish fire alarm systems to alert employees and the fire department during construction projects.
- Fire walls and exit stairways will be given priority during construction, and fire cutoffs will be retained as long as possible during alterations or renovation.

OSHA

Disposal of Waste Material

(1926.252)

- Whenever materials are dropped more than 20 feet to any point lying outside the exterior walls of the building, an enclosed chute shall be used.
- When debris is dropped through holes in the floor without the use of chutes, the area onto which the material is dropped shall be completely enclosed with barricades constructed in accordance with the standard.

OSHA

Lockout and Tagging of Circuits

(1926.417)

- The employer must maintain a written copy of the lockout/tagout procedures, and make the copy available to employees.
- Electric circuits and equipment must be de-energized prior to employees working on them.
 - Only qualified employees, as defined by the standard, can perform de-energization procedures.
 - Safe procedures for the de-energization must be determined prior to de-energizing circuits or equipment.
 - Stored electric energy which might endanger personnel must be released.
 - Capacitors must be discharged and high capacitance elements must be short-circuited and grounded if the stored electric energy might endanger personnel.
 - A qualified person must use test equipment to check that the circuit elements and electrical parts which employees will be exposed to are actually de-energized. The qualified person must also verify that the equipment cannot be restarted after de-energization.
- Locks and/or tags must be placed on each disconnecting means used to de-energize circuits and equipment as specified in the standard.
 - Locks must be applied in a way that will prevent any person from operating the disconnecting means without using undue force.
 - Each tag should contain a statement prohibiting unauthorized operation of the disconnect and removal of the tag.
 - If a tag is used without a lock, when permitted in the standard, at least one additional safety measure must be used which provides a level of security equivalent to the use of a lock.
- Re-energization steps outlined in the standard must be followed in order.
 - A qualified person must conduct tests and visual inspections, as necessary, to verify that all tools, electrical jumpers, shorts, grounds, and other such devices have been removed prior to re-energizing circuits or equipment.
 - All employees exposed to the hazards associated with re-energizing the equipment must be warned to stand clear.
 - Each lock and/or tag must be removed by the person who applied it, or under his/her direct supervision, except as allowed by the standard.
 - A visual determination must be made that all employees are clear of

the hazards associated with re-energizing equipment and circuits.

- When employees are exposed to parts of fixed electric equipment or circuits which have been de-energized, the

circuits must be locked out, tagged out, or both in accordance with the standard.

OSHA Scaffolding (1926.451)

- Scaffolds must be erected in accordance with the standard.
- The footing or anchorage for scaffolds must be sound, rigid and capable of carrying the maximum intended load without settling or displacement. Unstable objects cannot be used to support scaffolds.
- A competent person, as defined by the standard, must supervise the erection, movement, alteration, and dismantling of scaffolds.
- Guardrails and toeboards must be installed on all open sides and ends of platforms more than ten feet above the ground or floor, with the exception of needle beam scaffolds and floats. Scaffolds 4 feet to 10 feet in height, having a minimum horizontal dimension in either direction of less than 45 inches, must have standard guardrails installed on all open sides and ends. Guardrails, midrails, and toeboards must meet the requirements set forth in the standard.
- Scaffolds and their components must be capable of supporting 4 times the maximum intended load. Any scaffold component, including accessories must be immediately repaired or replaced when damaged or weakened by any cause.
- Lumber used in the construction of scaffolding must meet the specifications in the standard.
- An access ladder or other equivalent safe access must be provided.
- The height of free-standing mobile scaffold towers cannot exceed four times the minimum base dimension.
- The force necessary to move a mobile scaffold must be applied as near to the base as practicable, and the tower must be stabilized during movement from one location to another.
- Scaffolds can only be moved on level floors, free of obstructions and openings.
- Employees must not ride on manually propelled scaffolds unless the conditions listed in 1926.451 are met.

OSHA Grounding for Protection of Employees (1926.954)

- All conductors and equipment must be treated as energized until tested or

otherwise determined to be de-energized, or until grounded.

- Grounds should be placed between the work location and all sources of energy and as close as practicable to the work

location. The ground end should be attached first, and the other end attached and removed using insulating tools or other suitable devices.

EPA

Asbestos Hazard Emergency Response Act (AHERA)

- Signed into law on October 22, 1986.
- Required EPA to develop regulations which provide a comprehensive framework for addressing asbestos problems in public and private elementary and secondary schools. The regulations had to address:
 - The inspection of all public and private school buildings for ACM.
 - The identification of circumstances requiring response actions involving friable ACM.
 - Friable ACM means ACM, when dry, which may be crumbled, pulverized or reduced to powder by hand pressure and includes previously non-friable material which becomes damaged to the extent that when dry it may be crumbled, pulverized, or reduced to powder by hand.
 - A description of the appropriate response actions involving friable ACM.
- The implementation of response actions involving friable ACM, including non-friable ACM that becomes friable when being worked on.
- The establishment of a reinspection and periodic surveillance program for ACM.
- The establishment of an operations and maintenance program for friable ACM.
- The preparation and implementation of asbestos management plans by local educational agencies (LEAs) and the submission of the management plans to State Governors.
- The transportation and disposal of friable waste ACM from schools.
- A model accreditation plan for persons who inspect for asbestos, develop management plans, and design or conduct response actions.
- An accreditation program for laboratories which analyze asbestos bulk and air samples.

Summary of AHERA regulations

Regulations were issued as Asbestos-Containing Materials in Schools; Final Rule and Notice (40 CFR Part 763)

- Requires local education agencies (LEAs) to identify friable and nonfriable ACM in public and private elementary and secondary school buildings. Inspections of schools in existence at the time the standard was issued must have been completed by October 12, 1988. Buildings acquired after October 12, 1989, which will be used as schools, must be inspected prior to use as a school building (for emergency use they must be inspected within 30 days).
- Inspections and reinspections must follow the protocol specified in the standard (763.85), as must sampling (763.86), analysis (763.87) and assessment (763.88).
- Every time an assessment or reassessment is performed the accredited inspector must provide a written assessment of all friable known or assumed asbestos-containing

building material (ACBM) in the school building.

- LEAs must have submitted management plans to the Governor of their State by October 12, 1988, begun implementation of the management plans by July 9, 1989, and completed implementation in a timely fashion.
- LEAs must use accredited persons to conduct inspections, reinspections, and assessments, develop management plans, or perform response actions involving friable ACM, including non-friable ACM that becomes friable when worked on.
- LEAs must provide for the transportation and disposal of friable asbestos in accordance with EPA guidance documents.
- LEAs must ensure that all maintenance and custodial employees are properly trained according to Federal and/or State regulations.
- LEAs must ensure that workers and building occupants, or their legal guardians, are informed at least once each school year about asbestos inspections, reinspections, response actions involving friable ACM, and post-response action activities, including periodic reinspection and surveillance activities that are planned or in progress.
- LEAs must provide short term workers who may come in contact with ACM with information about the location of ACM and material assumed to be ACM.
- Warning labels, meeting the requirements of the standard, must be posted.
- Management plans must be available for inspection.
- A person must be designated to ensure that the requirements of the standard are met. The designated person must receive adequate training to perform all the duties required by the standard.
- Reinspections of schools must be performed at least once every three years after a management plan is in effect. The reinspection must follow the protocol set forth in the standard.
- The LEA must select and implement appropriate response actions involving friable ACM consistent with inspections and assessments which have been conducted by accredited inspectors. Accepted response actions involving friable ACM are outlined in 763.90.
- LEAs must implement asbestos operations and maintenance (O&M) programs whenever any friable ACBM is present or assumed to be present in a building it leases, owns or otherwise uses as a school building. O&M activities must follow the specifications of 763.91. Training of individuals involved with O&M activities must follow 763.92.
- At least once every 6 months after a management plan is in effect, a periodic surveillance of school buildings containing known or assumed ACBM must be performed.
- Management plans must be developed according the requirements of 763.93.
- Records associated with ACM in schools must be maintained in accordance with 763.94.

EPA

Asbestos School Hazard Abatement Reauthorization Act (ASHARA)

- Enacted on November 28, 1990.
- Applies to public and commercial buildings.
- Did not require public and commercial buildings to perform inspections for ACM.
- Expanded the accreditation requirements of AHERA to apply to certain persons who work with asbestos in public and commercial buildings. Specifically, accreditation is required for any person engaged in:
 - Inspecting for ACM.
 - Designing ACM response actions involving friable ACM, including non-friable ACM that becomes friable when being worked on.
 - Conducting response actions involving friable ACM. The number of training hours for asbestos abatement worker training was increased from 32 to 40.
 - Provided for a civil penalty for contractors who failed to comply with TSCA accreditation.

EPA Asbestos NESHAP (40 CFR 61.140-157)

Section 112 of the Clean Air Act (42 U.S.C. 7401 and following sections), enacted in 1970, requires the EPA to address hazardous air pollutants. The following year, EPA designated asbestos as a hazardous air pollutant under the Act, and later issued its National Emission Standard for Asbestos (40 CFR 61.140-157) as one of the National Emission Standards for Hazardous Air Pollutants (NESHAP).

In general, the asbestos NESHAP requires that the owner or operator of a facility or of a renovation or demolition activity at the facility:

- Inspect at least the area of the facility to be renovated or demolished for the presence of asbestos.
- Remove, transport and dispose of Regulated Asbestos-containing Material (RACM), as defined below, without releasing visible emissions, usually by using wet removal methods.
- Notify the EPA (or a State- or local-delegated agency) in advance of the removal, above specified project amounts or annual amounts, of these regulated ACM. Note: All demolition projects require notification, regardless of presence, or absence, of asbestos.
- Dispose of regulated asbestos-containing waste or convert it to non-asbestos material at an EPA-approved facility, and have a waste shipment record, signed by the waste generator, transporter(s) and disposal facility, returned promptly to the owner or operator.

NESHAP Coverage

The asbestos NESHAP covers most asbestos removed from buildings other than single-family houses or apartments of 4 or fewer units, which are not addressed by the standard. Before any renovation or demolition project, the affected area must be thoroughly inspected for the presence of asbestos. (The OSHA asbestos in construction standard describes requirements for this inspection for most buildings; the EPA AHERA standard does so for K-12 schools. See the discussion of these standards in this NIBS regulatory appendix.)

The standard requires agency notification (par.145(b)), control of asbestos emissions (par.145(c)), and control of asbestos waste disposal (par.150), for removing regulated ACM (defined below) of at least the following threshold amounts (par.145(a)):

- 260 linear feet (80 meters) on pipes,
- 160 square feet (15 square meters) on other facility components, or
- 35 cubic feet (1 cubic meter) off facility components where the length or area could not be measured previously,
- All demolition projects, even if no asbestos is present.

These amounts apply to a single renovation or demolition project. They also apply to work over a calendar year, such as from a series of renovations, demolitions, or an operations and maintenance program.

For demolitions involving smaller amounts of regulated ACM, or a facility

being demolished under a State or local government order because it is structurally unsound and in danger of imminent collapse, certain notification and controls are retained, but some are eliminated. (See below for descriptions.)

For the NESHAP, regulated ACM (RACM) is essentially ACM that may release fibers during or after the removal work. More formally, it is defined (par.141) as:

- Friable ACM, that is, ACM which, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.
- Category I nonfriable ACM (packing, gasket, resilient floor covering, or asphalt roofing product ACM) that has become friable, or will be or has been sanded, ground, abraded, or cut (but not sheared, sliced or punched).
- Category II nonfriable ACM (other nonfriable ACM) that has a high probability of becoming or has been crumbled, pulverized, or reduced to powder by the forces expected to act on the material.

Based on this definition, Category I nonfriable ACM that has not and will not become friable, sanded, ground, abraded, cut, sawed, sheared, sliced, or punched and Category II nonfriable ACM that has not and will not become crumbled, pulverized, or reduced to powder, are not RACM, and need not be removed prior to demolition. Mere breakage does not cause nonfriable ACM to become RACM.

Notification

For renovations involving the removal of RACM above the threshold amounts, and for all demolitions, the owner or operator must notify the EPA (or a State- or local-delegated agency) fully in advance on a project-by-project basis or annually (par.145(a)). Each individual project is covered, even if some or all of them are below the threshold amounts, when the threshold amounts are met or exceeded over a calendar year by all of the activities

at a facility together (par.145(a)(4)(iii)).

Note: Individual O&M activities which remove an amount of RACM above the notification threshold must be separately notified as specific planned projects.

Content:

These notifications for work at or above the threshold amounts must include the following items (par.145(c)(4)), using a

form similar to the form in the standard (par.145(b)(5)). (Note that States or localities may have additional notification requirements).

- Whether it is an original notice, or revises or cancels a previous notice.
- Contacts: Names, addresses and phone numbers of owner, removal contractor, and other contractor(s).
- Facility description: Address, work location, size of affected area, age, present and prior use.
- Operation description:
 - Whether work is renovation or demolition (taking out any load-supporting structural member and related handling, or intentional burning).
 - Inspection, sampling and analytical methods to detect RACM and nonfriable ACM. Note that these inspections generally must be performed by an EPA-MAP accredited person and many states require them to be licensed, as well. However, EPA does not require MAP accreditation for inspections of resilient flooring prior to removal or repair of flooring that has not been sanded, ground, mechanically chipped, drilled, abraded, or cut (sawed, but not sheared, sliced or punched).
 - Estimated amount of RACM to be removed.
 - Estimated amount of nonfriable ACM that will not be removed before any demolition.
 - Scheduled starting and completion dates of asbestos-related work, and of all of the demolition or renovation work.
 - Renovation, demolition, and asbestos emission control methods, and affected components.
 - Name and location of EPA-approved asbestos waste disposal site.
 - Certification that at least one “on-site representative” of management

trained in the NESHAP will be present during the asbestos demolition or renovation work (par.145(c)(8)). An OSHA ‘competent person’ may satisfy this requirement if trained in NESHAP requirements.

- Procedures to be followed if unexpected RACM is found or Category II nonfriable ACM becomes friable.

Schedule:

These notifications for work at or above the threshold amounts must be delivered to the agency:

- By regular mail, commercial delivery or hand delivery, but not facsimile or e-mail (par.145(b)(1)).
- For a single project, at least 10 working days before the start of work which may disturb asbestos (par.145(b)(3)(I)).
- For a calendar year’s worth of projects, at least 10 working days before the start of the calendar year. (Delivery by December 11 satisfies this requirement in every year.) For annual notification, the period of work in the notice is the whole year.
- For a delayed start, by telephone and written notice as soon as possible before the original starting date. For an advanced start, by written notice at least 10 working days before the asbestos work or demolition.
- When items in the notification change, including when the amount of asbestos affected changes by 20% or more or changes in start or completion dates.

Special cases:

For demolitions involving amounts of RACM smaller than the threshold (par.145(a)(2)): (However, note that all friable asbestos, in any amount, must be removed prior to demolition.)

- Notice must be delivered at least 10 working days before demolition starts.
- The form in the standard need not be

- used.
- Certain notification elements need not be provided:
 - Scheduled starting or completion dates of asbestos-related work, although the dates for the whole demolition or renovation work must still be given.
 - Renovation, demolition, or asbestos emission control methods, or affected components.
 - Waste disposal site name or location; or the transporter(s) contact information.
 - Having an “on-site representative,” although a “competent person” under the OSHA construction standard, with generally similar training, must still supervise the work.

For demolition under a State or local government order because a facility is structurally unsound and in danger of imminent collapse:

Controls

In general:

- Adequately wet all RACM (par. 145(c)(6)). (Note: user should become familiar with EPA Booklet, “Asbestos/NESHAP Adequately Wet Guidance” (Dec., 1990).) Certain exceptions are described below for using HEPA filtered control of stripping or leak-tight wrapping. Another exception is if the temperature at the point that would be wet is below 32°F (0°C), in which case (par. 145(c)(7)): (Note that EPA must give written permission for dry removal, except for freezing weather conditions.)
 - Remove facility components with RACM in units or sections to the maximum extent possible.
 - Record temperatures at the start, middle and end of the workday, and keep records on site at least 2 years.

- Deliver a copy of the order, and certain related information (par.145(b)(xv)).
- Some notification elements are reduced (par.145(a)(3)):
 - The notice must be delivered as early as possible before the asbestos work, but never later than the working day following its start.
 - Scheduled starting and completion dates of asbestos-related work need not be provided, but the dates of the whole demolition or renovation work must be submitted.

For emergency renovations resulting from sudden, unexpected events (par.145(a)(4)(iv)):

- The notice must be delivered as early as possible before the asbestos work, but never later than the working day following its start (par.145(b)(3)(iii)).
- No revised notice need be submitted if the starting date changes (par.145(b)(3)(iv)).

- Carefully lower RACM to the ground or floor (do not drop, throw, slide or otherwise damage or disturb it) (par. 145(c)(6)); if RACM is removed over 50 feet (15 meters) above ground level, transport it in leak-tight chutes or containers (par. 145(c)(6)(iii)).
- Have at least one on-site representative of management trained in the NESHAP and the means of complying with it, present during stripping, removal or handling or disturbance of RACM (par. 145(c)(8)).
 - The training of the on-site representative shall follow the curriculum in par. 145(c)(8), with documentation posted, and refreshed at least every 2 years.
 - The EPA accepts persons who are accredited as asbestos contractor/supervisors under AHERA as being trained as on-site

representatives under the NESHAP. A “competent person” or “qualified person” under the OSHA asbestos in construction or shipyard standards, respectively, may also be an on-site representative if that person’s training covers the NESHAP as well as OSHA requirements.

Before demolishing a building by burning, remove all ACM, including friable ACM, Category I nonfriable ACM, and Category II nonfriable ACM, in accordance with the NESHAP (par. 145(c)(10)).

Before a renovation or demolition that would break up, dislodge or similarly disturb RACM or preclude access to it for subsequent removal, remove all affected RACM (par. 145(c)(1)); except that the affected RACM need not be removed if the RACM is:

- Category I nonfriable ACM not in poor condition or friable.
- Category II nonfriable ACM unlikely to be made friable during or after the work.
- On a facility component encased in concrete or similarly hard material and is kept adequately wet whenever exposed during demolition.
- Untested because it was inaccessible until demolition, and the demolition has made its removal unsafe. This RACM and any asbestos-contaminated waste must be kept adequately wet until their disposal as asbestos-containing waste.

To remove a facility component containing, covered or coated with RACM, in units or sections:

- During removal, adequately wet RACM exposed, and carefully lower each unit or section (do not drop, throw, slide or otherwise damage or disturb the RACM) (par. 145(c)(2)).
- After removal, strip it of RACM, keeping the RACM adequately wet during stripping, or use a HEPA filtered local exhaust ventilation and control system during stripping (pars. 145(c)(4)).
- If it is a large facility component (e.g., reactor vessel, large tank, steam generator, but not a beam), it need not be stripped if it is encased in leak-tight wrapping with an asbestos danger label and handled without disturbing or damaging the RACM (par. 145(c)(5)).

To strip RACM from a facility component remaining in the facility (par. 145(c)(3)), adequately wet the RACM during stripping, unless the owner or operator:

- Has written approval by the EPA or designated agency (with the approval document on site) based on safety hazard or unavoidable equipment damage, and
- Uses an alternative control method: HEPA filtered local exhaust ventilation and collection system, a appropriate glove bag system, leak-tight wrapping before dismantling, or other EPA-approved method equivalent in its control efficiency (with the approval document on site).

Waste Disposal

RACM waste must meet NESHAP wetting and labeling requirements (par. 150). In general, waste collection, processing, packaging and transporting asbestos-containing waste must yield no visible emissions of asbestos to the outside

air.

- This is generally met by adequately wetting asbestos-containing waste:
 - For most waste disposal, the waste is sealed in leak-tight containers or wrapping labeled with OSHA

asbestos warning labels, the names of the waste generator, and the location of waste generation (par. 150(a)(1)), and deposited as soon as practical (pars. 150(b)(1),(2)) at a regulated waste disposal site or a facility that converts asbestos waste to asbestos-free waste approved by the EPA and operated as described in sec.155.

- For demolitions where some RACM was not removed beforehand, the asbestos-containing waste must be kept wet after demolition, during handling and loading for transport. The waste may be sealed in leak-tight containers or wrapping or transported and disposed of in bulk (par. 150(a)(3)).
- EPA-approved alternative methods of emission control during waste disposal may be used (par. 150(a)(4)).

Vehicles transporting asbestos-containing waste must be visibly marked with asbestos danger signs during loading and unloading of waste (par. 150(c)).

For all asbestos-containing waste being transported off the generating building site, a waste shipment record must be completed by the facility or removal project owner or operator.

- The waste shipment record must identify the EPA (or its designated agency) office, waste generator, waste transporter(s), and disposal site or

conversion facility; and characterize and certify the correctness of the classification, packing, marking and labeling of the waste (par. 150(d)(1)).

- The waste shipment record must be:
 - Signed by representatives of the owner or operator, the transporter(s) and the disposal site or conversion facility.
 - Returned to the owner or operator within 35 days after its departure from the building (par. 150(d)(1),(3)). (If it is not returned within 45 days, this must be reported to the EPA (par. 150(d)(4)).)
 - Retained for at least 2 years (par. 150(d)(5)).

Make all records relating to waste disposal available for EPA inspection (par. 150(e)).

- Exceptions:
 - Nonfriable ACM waste that did not become crumbled, pulverized, or reduced to powder need not meet NESHAP wetting and labeling requirements (par. 150(a)(5)).
 - Category I nonfriable ACM waste that has not nor will not become friable, sanded, ground, cut, or abraded need not be deposited at a regulated waste disposal site or waste conversion facility (par. 150(b)(3)).

DOT

Hazardous Material Rules

The Department of Transportation (DOT) issues hazardous material rules (HMR) under the Hazardous Materials Transportation Act, to help ensure that adequate information is available to transporters for their safety and that of the public, about materials being shipped commercially over public roads, waterways and airways.

The HMR does not cover asbestos fixed in a binder such as cement, plastic, asphalt, resins or mineral ore (e.g., non-friable

asbestos-containing material (ACM) that has not become crumbled, pulverized or reduced to powder), or asbestos containing manufactured products (e.g., pipe gaskets). Similarly, the HMR does not cover shipments under 1 pound of friable ACM.

Packaging of ACM for commercial transportation must meet hazardous material rule requirements (found mostly in 49 CFR 171-173) and generally be protective, marked and labeled.

Small quantities:

- Bulk samples over 1 ounce (30 grams) each of friable ACM are subject to the HMR if the whole package contains 1 pound or more.
- A "small quantity" shipment of bulk samples is exempt from the HMR if the samples are each 1 ounce (30 grams) or less in cushioned, securely sealed and packed inner containers of plastic (at least 8 mil (0.2 mm) thick), glass, metal or earthenware.
- The entire, strong package must weigh 64 pounds (29 kg) or less, and be specially marked.
- Packages of air sample filters are not subject to the HMR, since they contain less than 1 pound of friable asbestos.

Limited quantities:

- A "limited quantity" shipment is exempt from marking if it weighs 66 pounds (30 kg) or less with inner packagings up to 11 pounds (5 kg) each in the strong outer packaging.
- It is also exempt from labeling unless it is being shipped by air.

Labeling:

- Packages must generally have a class 9 label, unless excepted. (See "Small quantities," "Limited quantities," and "DOT exceptions".)

Shipping papers:

- Entries used in the hazardous material description on shipping papers are:
 - RQ,** Reportable Quantity, if 1 lb or more friable asbestos.
 - WASTE** For waste material, if applicable.
 - ASBESTOS** Shipping name; for domestic transportation only; see Note below.
 - MIXTURE,** For asbestos mixed with a binder or filler, etc.
 - 9,** Class 9, Miscellaneous Hazardous Materials, includes asbestos.
 - NA2212,** North American identification number; for domestic transportation only; see Note below.
 - PG III** Packing Group; for domestic transportation only; see Note below.
 - LTD QTY,** Limited quantity, if applicable.
 - 20 OZ** Total quantity of material described; may abbreviate unit.

Note: See international transportation requirements, below.

Marking:

- Packaging must be marked, except for small quantities, limited quantities, and exempt packages. See "Small quantities."
- Entries for non-bulk packagings:
 - RQ,** Reportable Quantity, if 1 lb or more friable asbestos.
 - WASTE,** For waste material, if applicable, or use EPA mark.
 - ASBESTOS,** Shipping name; for domestic transportation only; see Note below.
 - MIXTURE,** For asbestos mixed with a binder or filler, etc.
 - NA2212,** North American identification number; for domestic transportation only; see Note below.
 - JANE Q. PUBLIC INTL. CO.** Consignee or consignor name and address;
 - 1234 MAIN ST.** except some direct road or train transport.
 - OURTOWN, ZZ 99999**

Note: See international transportation requirements, below.

- A bulk packaging (uncommon for asbestos waste shipments) must be marked with a panel, placard or other display.

Shipping limitation:

- For domestic transportation, asbestos shipments are limited to 440 pounds (200 kg) by aircraft or passenger-carrying railcars, unless the asbestos is stabilized in a binder.

Vehicle marking:

- A vehicle transporting asbestos-containing waste subject to the HMR must be marked with asbestos danger signs during loading and unloading of the waste.

Waste shipment record:

- The record must be completed as required for each shipment of ACM waste subject to the HMR. building site, and a copy signed by the disposal site must be received in 45 days.
- A copy signed by the transporter must be given to the waste generator, (i.e., the building owner or operator, such as a maintenance or abatement contractor) when the waste leaves the building site, and a copy signed by the disposal site must be received in 45 days.
- If the record is not received within 35 days, the transporter or disposal site must be contacted to determine the status of the waste shipment.

International transportation:

- The HMR defines:
 - Crocidolite asbestos as "blue asbestos."
 - Amosite and mysorite asbestos as "brown asbestos."
 - Chrysotile, actinolite, anthophyllite and tremolite asbestos as "white asbestos."
- Shipping limitations:
 - "Blue" or "brown" asbestos, other than a "small quantity" shipment or ACM which is stabilized in a binder (e.g., nonfriable ACM in good condition; see "DOT exceptions"), is forbidden from aircraft or passenger-carrying railcars.
 - "White" asbestos is limited to 440 pound (200 kg) shipments by aircraft or passenger-carrying railcars, unless it is similarly stabilized in a binder.
 - Information: For international transportation, the following United Nations (UN) shipping names, identification numbers and packing groups must be used. (They may also be used for domestic transportation.)

WHITE (or BLUE or BROWN) ASBESTOS	UN shipping names; see "shipping limitations," below.
UN2590 (or UN2212, or UN2212)	UN identification numbers.
PG III (or II or II),	Packing Groups; II and III are medium and minor; use II if mixed shipment.

- Marking mixed international shipments: When asbestos of two or more UN descriptions are mixed in an international shipment, each is listed on the mark and shipping papers. For example, a shipping paper might show: "RQ, Waste blue and white asbestos mixture, 9, UN2212 and UN2590, PG II, Ltd Qty, 22 lbs."

DOT Exceptions:

- The HMR does not cover asbestos fixed in a binder such as cement, plastic, asphalt, resins or mineral ore (e.g., non-friable ACM that has not become crumbled, pulverized or reduced to powder), or asbestos containing manufactured products (e.g., pipe gaskets).
- The HMR does not cover shipments under 1 pound of friable ACM.
- Packaging of ACM must meet specific requirements, but need not meet HMR performance oriented packaging specifications for Packing Groups II and III.

APPENDIX B

EPA GUIDANCE DOCUMENTS

EPA Guidance Documents which discuss asbestos abatement work or hauling and disposal of asbestos waste materials are listed below. EPA publications can be ordered from (202) 554-1404 in Washington, DC:

Asbestos-Containing Materials in School Buildings - A Guidance Document. Part 1 & 2. (Orange Books) EPA C00090 (out of print)

Guidance for Controlling Asbestos-Containing Materials in Buildings (Purple Book) EPA 560/5-85-024

Asbestos in Buildings: National Survey of Asbestos-Containing Friable Materials. EPA 560/5-84-006.

Asbestos in Buildings: Guidance for Service and Maintenance Personnel. EPA 560/5-85-018.

Asbestos in Buildings. Simplified Sampling Scheme for Friable Surfacing Materials. (Pink Book) EPA 560/5-85-030a

A Guide to Respiratory Protection for the Asbestos Abatement Industry. EPA-560-OPTS-86-001

Managing Asbestos in Place: A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials. (Green Book) EPA 20T-2003, July 1990.

A Guide to the Asbestos NESHAP - As revised November 1990 (EPA 340/1-90-015)

Reporting and Recordkeeping Requirements for Waste Disposal - A Field Guide (EPA 340/1-90-016)

Asbestos/NESHAP Regulated Asbestos-Containing Materials Guidance (EPA) 340/1-90-018)

Asbestos/NESHAP Adequately Wet Guidance (EPA 340/1-90-019)

Test Method: For Determination of Asbestos in Bulk Building Materials. (EPA 600/R-93/116, July 1993) (Available through National Technical Information Service, (703) 487-4650, NTIS ref # is PB93-218576)

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APPENDIX C

PERFORMANCE SPECIFICATION

The *NIBS Model Guide Specifications* are prescriptive in nature, each section explicitly sets forth the way in which the work is to be accomplished. The contractor is given virtually step-by-step instructions for each work activity. Responsibility for the success of the work practices used in the project lies with the designer.

Project can also be based on a performance specification which sets forth the requirements that must be met when the work is complete, but allows the contractor to meet these requirements by any method. Performance based specifications allow the maximum flexibility for the contractor, but relies for success on the skill and knowledge of the contractor.

For designers desiring a sample of a performance based specification, the specification used by the US Navy follows. The approach represented by the Navy performance specification works well for an owner that has a well developed and experienced infrastructure of contracting and contract enforcement officers. The work practices proposed by the contractor need to be evaluated by a contracting officer that is knowledgeable in asbestos abatement practices. The contractor's work also needs to be evaluated by a contract enforcement officer that is familiar with asbestos abatement practices.

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NFGS-13281

ENGINEERING CONTROL OF ASBESTOS CONTAINING MATERIALS

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* Preparing Activity: NAVFACENGCOMHQ (15G) *
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*      Typed Name & Reg.           Signature      Date           *
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* Prepared by: Pepito Marquez, P.E. /s/           12/31/95 *
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* Approved for NAVFAC:           /s/           12/31/95 *
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DEPARTMENT OF THE NAVY
NAVAL FACILITIES
ENGINEERING COMMAND
GUIDE SPECIFICATION

NFGS-13281
31 December 1995

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SECTION 13281

ENGINEERING CONTROL OF ASBESTOS CONTAINING MATERIALS
12/95

NOTE: This guide specification covers safety procedures and requirements for the demolition, removal, encapsulation, and disposal of asbestos containing materials (ACM). Federal regulations require EPA model accreditation plan training to edit this document. Furthermore, asbestos abatement designers must be accredited and licensed to design asbestos work in the location of the construction.

Nonfriable asbestos containing materials do not always require special handling. However, during demolition and removal of this material dust and airborne asbestos fibers will sometimes be released. If the project contains nonfriable asbestos which may release fibers when demolished and removed, the nonfriable asbestos shall be removed in the same way as friable asbestos.

Asbestos operations do not always indicate negative pressure enclosure type asbestos control with all of its attendant requirements. The location of the area, type of material, and initial as well as other exposure assessments for abatement workers and the environment must be reviewed and a judgement made by the designer as to the precise asbestos control techniques described herein that may be safely and legally used.

It is the policy of the Navy to eliminate the use of materials containing asbestos wherever possible. Therefore, the designer shall not use asbestos containing materials wherever a substitute, suitable to the Navy, exists.

The limits and conditions of asbestos hazard abatement efforts must be indicated on the drawings or in the specification in sufficient detail for the Contractor to submit an accurate bid. Portions of the building where asbestos work will take place must be unoccupied during the removal operation. It is highly recommended that the entire building be unoccupied during asbestos hazard abatement operations. If portions of the building where asbestos hazard abatement is not taking place must remain occupied, additional requirements must be added for providing temporary heating/cooling and other utilities to the occupied portions of the building. The building heating/cooling system for example cannot be operated in the asbestos control area and due to wet removal procedures, electrical service to the asbestos control area may need to be shut off and resupplied through a ground fault circuit interrupter. In addition, the rooms with openings into the room undergoing asbestos abatement must be empty with critical barriers installed to provide a buffer zone.

NOTE: This section replaces NFGS-02081D dated 30 June 1995 to accommodate the new 1995 CSI MasterFormat.

NOTE: The following information shall be shown on the project drawings:

- 1. The project drawings shall clearly show location, extent, condition and form of asbestos materials to be controlled or in contact with other non-ACM removals or new work.

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z9.2 (1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems

ANSI Z88.2 (1992) Respiratory Protection

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 732 (1982; R 1987) Aging Effects of Artificial Weathering on Latex Sealants

ASTM D 522 (1993; Rev. A) Mandrel Bend Test of Attached Organic Coatings

ASTM D 1331 (1989) Surface and Interfacial Tension of Solutions of Surface-Active Agents

ASTM D 2794 (1993) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)

ASTM E 84 (1994) Surface Burning Characteristics of Building Materials

ASTM E 96 (1994) Water Vapor Transmission of Materials

ASTM E 119 (1988) Fire Tests of Building Construction and Materials

ASTM E 736 (1992) Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

ASTM E 1368 (1990) Visual Inspection of Asbestos Abatement Projects

ASTM E 1494 (1992) Encapsulants for Spray- or Trowel-Applied Friable Asbestos-Containing Building Materials

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1926.103	Respiratory Protection
29 CFR 1926.51	Sanitation
29 CFR 1926.200	Accident Prevention Signs and Tags
29 CFR 1926.59	Hazard Communication
29 CFR 1926.1101	Asbestos, Tremolite, Anthophyllite, Actinolite
40 CFR 61-SUBPART A	General Provisions
40 CFR 61-SUBPART M	National Emission Standard for Asbestos
40 CFR 763	Asbestos Containing Material in Schools

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 560/5-85-024	Guidance for Controlling Asbestos Containing Materials in Buildings
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NAVY DIRECTIVES (ND)

ND OPNAVINST 5100.23	(Rev. D) Navy Occupational Safety and Health (NAVOSH) Program Manual
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UNDERWRITERS LABORATORIES INC. (UL)

UL 586	(1990) High-Efficiency, Particulate, Air Filter Units
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1.2 DEFINITIONS

1.2.1 ACM

Asbestos Containing Materials.

1.2.2 Amended Water

Water containing a wetting agent or surfactant with a maximum surface tension of 2.9 Pa (29 dynes per square centimeter) when tested in accordance with ASTM D 1331.

1.2.3 Area Sampling

Sampling of asbestos fiber concentrations which approximates the concentrations of asbestos in the theoretical breathing zone but is not actually collected in the breathing zone of an employee.

1.2.4 Asbestos

The term asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, and actinolite asbestos and any of these minerals that has been chemically treated or altered. Materials are considered to contain asbestos if the asbestos content of the material is determined to be at least one percent.

1.2.5 Asbestos Control Area

That area where asbestos removal operations are performed which is isolated by physical boundaries which assist in the prevention of the uncontrolled release of asbestos dust, fibers, or debris.

1.2.6 Asbestos Fibers

Those fibers having an aspect ratio of at least 3:1 and longer than 5 micrometers as determined by National Institute for Occupational Safety and Health (NIOSH) Method 7400.

1.2.7 Asbestos Permissible Exposure Limit

0.1 fibers per cubic centimeter of air as an 8-hour time weighted average measured in the breathing zone as defined by 29 CFR 1926.1101 or other Federal legislation having legal jurisdiction for the protection of workers health.

1.2.8 Background

The ambient airborne asbestos concentration in an uncontaminated area as measured prior to any asbestos hazard abatement efforts. Background concentrations for other (contaminated) areas are measured in similar but asbestos free locations.

1.2.9 Contractor

The Contractor is that individual, or entity under contract to the Navy to perform the herein listed work.

1.2.10 Encapsulation

The abatement of an asbestos hazard through the appropriate use of chemical encapsulants.

1.2.11 Encapsulants

Specific materials in various forms used to chemically or physically entrap asbestos fibers in various configurations to prevent these fibers from becoming airborne. There are four types of encapsulants as follows which must comply with performance requirements as specified herein.

- a. Removal Encapsulant (can be used as a wetting agent)
- b. Bridging Encapsulant (used to provide a tough, durable surface coating to asbestos containing material)
- c. Penetrating Encapsulant (used to penetrate the asbestos containing material encapsulating all asbestos fibers and preventing fiber release due to routine mechanical damage)
- d. Lock-Down Encapsulant (used to seal off or "lock-down" minute asbestos fibers left on surfaces from which asbestos containing material has been removed).

1.2.12 Friable Asbestos Material

One percent asbestos containing material that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

1.2.13 Glovebag Technique

Those asbestos removal and control techniques put forth in 29 CFR 1926.1101 Appendix G.

1.2.14 HEPA Filter Equipment

High efficiency particulate air (HEPA) filtered vacuum and/or exhaust ventilation equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall retain 99.97 percent of particles 0.3 microns or larger as indicated in UL 586.

1.2.15 Navy Consultant (NC)

That qualified person employed directly by the Government to monitor, sample, inspect the work or in some other way advise the Contracting Officer. The NC is normally a private consultant, but can be an employee of the Government.

1.2.16 Negative Pressure Enclosure (NPE)

That engineering control technique described as a negative pressure enclosure in 29 CFR 1926.1101.

1.2.17 Nonfriable Asbestos Material

Material that contains asbestos in which the fibers have been immobilized by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not normally release asbestos fibers during any appropriate use, handling, storage or transportation. It is understood that asbestos fibers may be released under other conditions such as demolition, removal, or mishap.

1.2.18 Personal Sampling

Air sampling which is performed to determine asbestos fiber concentrations within the breathing zone of a specific employee, as performed in accordance with 29 CFR 1926.1101.

1.2.19 Private Qualified Person (PQP)

That qualified person hired by the Contractor to perform the herein listed tasks.

1.2.20 Qualified Person (QP)

A Registered Architect, Professional Engineer, Certified Industrial Hygienist, consultant or other qualified person who has successfully completed training and is therefore accredited under a legitimate State Model Accrediation Plan as described in 40 CFR 763 as a Building Inspector, Contractor/Supervisor Abatement Worker, and Asbestos Project Designer; and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The QP must be qualified to perform visual inspections as indicated in ASTM E 1368. [The QP shall be appropriately licensed in the State of [_____].]

1.2.21 TEM

Refers to Transmission Electron Microscopy.

1.2.22 Time Weighted Average (TWA)

The TWA is an 8-hour time weighted average airborne concentration of asbestos fibers.

1.2.23 Wetting Agent

A chemical added to water to reduce the water's surface tension thereby increasing the water's ability to soak into the material to which it is applied. An equivalent wetting agent must have a surface tension of at most 2.9 Pa (29 dynes per square centimeter) when tested in accordance with ASTM D 1331.

1.3 REQUIREMENTS

1.3.1 Description of Work

NOTE: Specify the form, condition and approximate quantity [square meters or linear meters] [square feet or linear feet] of asbestos material to be controlled in the first blank and the location of the material in the second blank. Example: "The

asbestos work includes the demolition and removal of [90 m of 200 mm] [300 feet of 8 inch] diameter asbestos insulation located on existing steam piping indicated to be removed in the boiler room." or "The asbestos work includes the encapsulation of [270 square meters] [3,000 square feet] of sprayed on asbestos containing fire proofing materials located above the ceiling throughout the structure."

The use of this section in the contract specification means that known asbestos material is involved. Estimate the quantity and specify as unit price items in Section 00200, "Instructions to Bidders" or Section 01200, "Price and Payment Procedures" per standard practice of the activity preparing the contract.

NOTE: Include reference to 40 CFR 763 when asbestos work occurs in a public or private school Grades K thru 12.

NOTE: Nonfriable ACM may not require special handling. However, during demolition and removal of this material dust and airborne asbestos fibers will sometimes be released. If the project contains nonfriable asbestos which may release fibers when demolished and removed, the nonfriable asbestos shall be removed in the same way as friable asbestos. Include "Under normal.... specified herein.", if material traditionally defined as non-friable asbestos materials are to be removed.

NOTE: The appropriate engineering control technique must comply with the requirements outlined in 29 CFR 1926.1101 which is selected based on existing conditions, but must be that technique that provides the best control during abatement at most reasonable cost.

The work covered by this section includes the handling and control of asbestos containing materials and describes some of the resultant procedures and equipment required to protect workers, the environment and occupants of the building or area, or both, from contact with airborne asbestos fibers. The work also includes the disposal of any asbestos

containing materials generated by the work. More specific operational procedures shall be outlined in the Asbestos Hazard Abatement Plan called for elsewhere in this specification. The asbestos work includes the [demolition and removal] [encapsulation] of [_____] located [_____] [which is governed by 40 CFR 763]. [Under normal conditions non-friable or chemically bound materials containing asbestos would not be considered hazardous; however, this material may release airborne asbestos fibers during demolition and removal and therefore must be handled in accordance with the removal and disposal procedures as specified herein.] Provide [negative pressure enclosure] [_____] techniques as outlined in this specification. The Navy will evacuate the [building] [work area] during the asbestos abatement work.

1.3.2 Medical Requirements

Provide medical requirements including but not limited to medical surveillance and medical record keeping as listed in 29 CFR 1926.1101.

1.3.2.1 Medical Examinations

Before exposure to airborne asbestos fibers, provide workers with a comprehensive medical examination as required by 29 CFR 1926.1101 or other pertinent State or local directives. This requirement must have been satisfied within the 12 months prior to the start of work on this contract. The same medical examination shall be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. Specifically identify x-ray films of asbestos workers to the consulting radiologist and mark medical record jackets with the word "ASBESTOS."

1.3.2.2 Medical Records

NOTE: Medical records shall be retained at least 50 years. Some States require longer retention periods. Check with the State in which the project is located for the required retention time.

Maintain complete and accurate records of employees' medical examinations, medical records, and exposure data for a period of [50 years] [indefinite time] after termination of employment and make records of the required medical examinations and exposure data available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health (OSHA), or authorized representatives of them, and an employee's physician upon the request of the employee or former employee.

1.3.3 Training

Train all personnel involved in the asbestos control work in accordance with United States Environmental Protection Agency (USEPA) Asbestos Hazard

Emergency Response Act (AHERA) training criteria or State training criteria whichever is more stringent. The Contractor shall document the training by providing: dates of training, training entity, course outline, names of instructors, and qualifications of instructors upon request by the Contracting Officer. Furnish each employee with respirator training and fit testing administered by the PQP as required by 29 CFR 1926.1101. Fully cover engineering and other hazard control techniques and procedures.

1.3.4 Permits [, Licenses,] and Notifications

NOTE: The USEPA has delegated the responsibility of notification requirements to most States. Verify with the State and local authorities where the project is located whether the city, county, State, and/or USEPA has jurisdiction and whether a license is required.

Obtain necessary permits [and licenses] in conjunction with asbestos removal, encapsulation, hauling, and disposition, and furnish notification of such actions required by Federal, State, regional, and local authorities prior to the start of work. Notify the [Regional Office of the United States Environmental Protection Agency (USEPA)] [State's environmental protection agency] [local air pollution control district/agency] and the Contracting Officer in writing 10 working days prior to commencement of work in accordance with 40 CFR 61-SUBPART M.

1.3.5 Environment, Safety and Health Compliance

NOTE: The designer shall research the State, regional and local laws, regulations, statutes, etc., and list by authority and document number in the blank spaces provided those which apply to the asbestos work to be performed by the Contractor.

In addition to detailed requirements of this specification, comply with those applicable laws, ordinances, criteria, rules, and regulations of Federal, State, regional, and local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials. Comply with the applicable requirements of the current issue of 29 CFR 1926.1101, 40 CFR 61-SUBPART A, 40 CFR 61-SUBPART M, and ND OPNAVINST 5100.23. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work. Where the requirements of this specification, applicable laws, rules, criteria, ordinances, regulations, and referenced documents vary, the most

stringent requirement as defined by the Government shall apply. The following laws, ordinances, criteria, rules and regulations regarding removal, handling, storing, transporting and disposing of asbestos materials apply:

- a. [_____]
- b. [_____]
- c. [_____].

1.3.6 Respiratory Protection Program

Establish and implement a respirator program as required by ANSI Z88.2, 29 CFR 1926.1101, and 29 CFR 1926.103. Submit a written description of the program to the Contracting Officer.

1.3.7 Asbestos Hazard Control Supervisor

The Contractor shall be represented on site by a supervisor, trained using the model Contractor accreditation plan as indicated in the Federal statutes for all portions of the herein listed work.

1.3.8 Hazard Communication

Adhere to all parts of 29 CFR 1926.59 and provide the Contracting Officer with a copy of the Material Safety Data Sheets (MSDS) for all materials brought to the site.

1.4 SUBMITTALS

NOTE: The submittals required for each project are very dependent upon the removal method to be used. Edit the submittals paragraph accordingly.

NOTE: Where a "G" in asterisk tokens follows a submittal item, it indicates Government approval for that item. Add "G" in asterisk tokens following any added or existing submittal items deemed sufficiently critical, complex, or aesthetically significant to merit approval by the Government. Submittal items not designated with a "G" will be approved by the QC organization.

Submit the following in accordance with Section 01330, "Submittal Procedures."

1.4.1 SD-02, Manufacturer's Catalog Data

- a. Local exhaust equipment G
- b. Vacuums G
- c. Respirators G
- d. Pressure differential automatic recording instrument G
- e. Amended water G
- [f. Glovebags G]
- g. Material Safety Data Sheets (MSDS) for all materials proposed for transport to the project site G
- h. Encapsulants G

1.4.2 SD-08, Statements

- a. Asbestos hazard abatement plan G
- b. Testing laboratory G
- c. Private qualified person documentation G
- d. Landfill approval G
- e. Employee training G
- f. Medical certification requirements G
- g. Waste shipment records and if applicable exemption report G
- h. Respiratory Protection Program G
- i. Hazardous waste manifest G

1.4.2.1 Asbestos Hazard Abatement Plan

Submit a detailed plan of the safety precautions such as lockout, tagout, tryout, fall protection, and confined space entry procedures and equipment and work procedures to be used in the [encapsulation] [removal] [and demolition] of materials containing asbestos. The plan shall be prepared, signed, and sealed by the PQP. Such plan shall include but not be limited to the precise personal protective equipment to be used including, but not limited to, respiratory protection, type of whole-body protection [and if reusable coveralls are to be employed decontamination methods (operations and quality control plan)], the location of asbestos control areas

including clean and dirty areas, buffer zones, showers, storage areas, change rooms, [removal] [encapsulation] method, interface of trades involved in the construction, sequencing of asbestos related work, disposal plan, type of wetting agent and asbestos sealer to be used, locations of local exhaust equipment, planned air monitoring strategies, and a detailed description of the method to be employed in order to control environmental pollution. The plan shall also include (both fire and medical emergency) response plans. The Asbestos Hazard Abatement Plan must be approved in writing prior to starting any asbestos work. The Contractor, Asbestos Hazard Control Supervisor, and PQP shall meet with the Contracting Officer prior to beginning work, to discuss in detail the Asbestos Hazard Abatement Plan, including work procedures and safety precautions. Once approved by the Contracting Officer, the plan will be enforced as if an addition to the specification. Any changes required in the specification as a result of the plan shall be identified specifically in the plan to allow for free discussion and approval by the Contracting Officer prior to starting work.

1.4.2.2 Testing Laboratory

Submit the name, address, and telephone number of each testing laboratory selected for the [sampling,] analysis, and reporting of airborne concentrations of asbestos fibers along with [evidence that each laboratory selected holds the appropriate State license and/or permits and] certification that each laboratory is American Industrial Hygiene Association (AIHA) accredited and that persons counting the samples have been judged proficient by current inclusion on the AIHA Asbestos Analysis Registry (AAR) and successful participation of the laboratory in the Proficiency Analytical Testing (PAT) Program. Where analysis to determine asbestos content in bulk materials or transmission electron microscopy is required, submit evidence that the laboratory is accredited by the National Institute of Science and Technology (NIST) under National Voluntary Laboratory Accreditation Program (NVLAP) for asbestos analysis.

1.4.2.3 Private Qualified Person Documentation

Submit the name, address, and telephone number of the Private Qualified Person (PQP) selected to prepare the Asbestos Hazard Abatement Plan, direct monitoring and training, and documented evidence that the PQP has successfully completed training in and is accredited and where required is certified as, a Building Inspector, Contractor/Supervisor Abatement Worker, and Asbestos Project Designer as described by 40 CFR 763 and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. [The PQP shall be appropriately licensed in the State of ____].]

1.4.2.4 Landfill Approval

NOTE: The USEPA has delegated the responsibility of approving landfills for the disposal of asbestos to

most States. Verify with the State in which the project is located whether the State or USEPA has jurisdiction and what laws apply.

Submit written evidence that the landfill for disposal is approved for asbestos disposal by the [USEPA] [and] [State] [and] [local] regulatory agency(s). Submit to the Contracting Officer, waste shipment records, prepared in accordance with Federal regulations, signed and dated by an agent of the landfill, certifying the amount of asbestos materials delivered to the landfill, within 3 days after delivery. In those States that require a hazardous waste manifest the Contractor shall submit, within 3 days, signed copies of such to the Contracting Officer.

1.4.2.5 Employee Training

NOTE: Include bracketed sentence where required by law, regulation or statute.

Submit certificates signed by each employee indicating that the employee has received training in the proper handling of materials and wastes that contain asbestos in accordance with 40 CFR 763; understands the health implications and risks involved, including the illnesses possible from exposure to airborne asbestos fibers; understands the use and limits of the 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. [Post appropriate evidence of compliance with the training requirements of 40 CFR 763.]

1.4.2.6 Medical Certification

Provide a written certification for each worker and supervisor, signed by a licensed physician indicating that the worker and supervisor has met or exceeded all of the medical prerequisites listed herein and in 29 CFR 1926.1101 and 29 CFR 1926.103 as prescribed by law.

1.4.2.7 Respiratory Protection Program

Submit a written program manual or operating procedure including methods of compliance with regulatory statutes.

1.4.3 SD-12, Field Test Reports

- a. Air sampling results G
- b. Pressure differential recordings for local exhaust system G
- c. Asbestos disposal quantity report G

d. Encapsulation test patches G

e. Clearance sampling G

1.4.3.1 Air Sampling Results

NOTE: Normal practice is to have the Contractor hire one independent Private Qualified Person (the PQP) to perform all required functions. However, some applicable laws forbid this approach and will dictate when the PQP, the NC or both will be required to perform the function involved. However, the Contractor shall always hire a PQP.

Complete fiber counting and provide results to the [PQP] [and] [NC] for review within 16 hours of the "time off" of the sample pump. Notify the Contracting Officer immediately of any airborne levels of asbestos fibers in excess of the acceptable limits. Submit sampling results to the Contracting Officer and the affected Contractor employees where required by law within 3 working days, signed by the testing laboratory employee performing air sampling, the employee that analyzed the sample, and the [PQP] [and] [NC]. Notify the Contractor and the Contracting Officer immediately of any variance in the pressure differential which could cause adjacent unsealed areas to have asbestos fiber concentrations in excess of 0.01 fibers per cubic centimeter or background whichever is higher. In no circumstance shall levels exceed 0.1 fibers per cubic centimeter.

1.4.3.2 Pressure Differential Recordings for Local Exhaust System

NOTE: When an negative pressure enclosure is not required, delete the requirements for the local exhaust system and pressure differential recording.

NOTE: Normal practice is to have the Contractor hire one independent Private Qualified Person (the PQP) to perform all required functions. However, some applicable laws forbid this approach and will dictate when the PQP, the NC or both will be required to perform the function involved. However, the Contractor shall always hire a PQP.

Provide a local exhaust system that creates a negative pressure of at least 0.51 mm (0.02 inches) of water relative to the pressure external to the enclosure and operate it continuously, 24 hours a day, until the temporary enclosure of the asbestos control area is removed. Submit

pressure differential recordings for each work day to the [PQP] [and] [NC] for review and to the Contracting Officer within 24 hours from the end of each work day.

1.4.4 SD-13, Certificates

- a. Vacuums G
- b. Water filtration equipment G
- c. Ventilation systems G
- d. Other equipment used to contain airborne asbestos fibers G
- e. Chemical encapsulants sealers G

Show compliance with ANSI Z9.2 by providing manufacturers' certifications.

1.4.5 SD-18, Records

- a. Notifications G
- b. Rental equipment G
- c. Respirator program records G
- d. Permits [and licenses] G
- [e. Protective clothing decontamination quality control records G]
- [f. Protective clothing decontamination facility notification G]

1.4.5.1 Notifications

Notify the Contracting Officer and other appropriate Government agencies in writing 10 working days prior to the start of asbestos work as indicated in applicable laws, ordinances, criteria, rules, and regulations. [Notify the local fire department 3 days prior to removing fire-proofing material from the building including notice that the material contains asbestos.]

1.4.5.2 Rental Equipment

Provide a copy of the written notification to the rental company concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

1.4.5.3 Respirator Program Records

Submit records of the respirator program as required by ANSI Z88.2, 29 CFR 1926.103, and 29 CFR 1926.1101.

1.4.5.4 [Protective Clothing Decontamination Quality Control Records

Provide all records that document quality control for the decontamination of reusable outer protective clothing.]

1.4.5.5 [Protective Clothing Decontamination Facility Notification

Submit written evidence that persons who decontaminate, store, or transport asbestos contaminated clothing used in the performance of this contract were duly notified in accordance with 29 CFR 1926.1101.]

PART 2 PRODUCTS

2.1 ENCAPSULANTS

Shall conform to current USEPA requirements, shall contain no toxic or hazardous substances as defined in 29 CFR 1926.59, and shall conform to the following performance requirements.

2.1.1 Removal Encapsulants

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E 84
Life Expectancy - 20 years	ASTM C 732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E 96

2.1.2 Bridging Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E 84
Life Expectancy - 20 years	ASTM C 732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E 96
Fire Resistance - Negligible affect on fire resistance rating over 3 hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E 119
Impact Resistance - Minimum 245.5 mm/N (43 in/lb)	ASTM D 2794 Gardner Impact Test

Flexibility - no rupture or cracking ASTM D 522
Mandrel Bend Test

2.1.3 Penetrating Encapsulant

Requirement Test Standard

Flame Spread - 25, Smoke Emission - 50 ASTM E 84

Life Expectancy - 20 years ASTM C 732 Accelerated Aging Test

Permeability - Minimum 0.4 perms ASTM E 96

Cohesion/Adhesion Test - ASTM E 736
729.5 N of force/meter
(50 pounds of force/foot)

Fire Resistance - Negligible affect on ASTM E 119
fire resistance rating over 3 hour test
(Classified by UL for use over fibrous
and cementitious sprayed fireproofing)

Impact Resistance - Minimum ASTM D 2794
245.5 mm/N (43 in/lb) Gardner Impact Test

Flexibility - no rupture or cracking ASTM D 522
Mandrel Bend Test

2.1.4 Lock-down Encapsulant

Requirement Test Standard

Flame Spread: 25, Smoke Emission - 50 ASTM E 84

Life Expectancy: 20 years ASTM C 732 Accelerated Aging Test

Permeability: Minimum 0.4 perms ASTM E 96

Fire Resistance: Negligible affect on ASTM E 119
fire resistance rating over 3 hour test
(Tested with fireproofing over encapsulant
applied directly to steel member)

Bond Strength: 1459 N of force/meter ASTM E 736
(100 pounds of force/foot) (Tests
compatibility with cementitious and fibrous
fireproofing)

PART 3 EXECUTION

3.1 EQUIPMENT

NOTE: Modify the number of sets of protective equipment as required, depending on the size of the asbestos removal project. Larger projects may require more than two persons on an inspection team.

At all times, provide the Contracting Officer or the Contracting Officer's Representative, with at least [two] [_____] complete sets of personal protective equipment [including decontaminating reusable coveralls] as required for entry to and inspection of the asbestos control area. Provide equivalent training to the Contracting Officer or a designated representative as provided to Contractor employees in the use of the required personal protective equipment. Provide manufacturer's certificate of compliance for all equipment used to contain airborne asbestos fibers.

3.1.1 Respirators

Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

3.1.1.1 Respirators for Handling Asbestos

Provide personnel engaged in pre-cleaning, cleanup, handling, [encapsulation] [removal] [and] [or] [demolition] of asbestos materials with respiratory protection as indicated in 29 CFR 1926.1101 and 29 CFR 1926.103.

3.1.2 Exterior Whole Body Protection

3.1.2.1 Outer Protective Clothing

Provide personnel exposed to asbestos with disposable "non-breathable," [or reusable "non-breathable"] whole body outer protective clothing, head coverings, gloves, and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber gloves for comfort, but shall not be used alone. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck by the use of tape. [Reusable whole body outer protective clothing shall be either disposed of as asbestos contaminated waste upon exiting from the asbestos regulated work area or be properly decontaminated.]

3.1.2.2 Work Clothing

Provide cloth work clothes for wear under the outer protective clothing and foot coverings and either dispose of or properly decontaminate them as recommended by the [NC] [PQP] after each use.

3.1.2.3 Personal Decontamination Unit

Provide a temporary, negative pressure unit with a separate decontamination locker room and clean locker room with a shower that complies with 29 CFR 1926.51(f)(4)(ii) through (V) in between for personnel required to wear whole body protective clothing. Provide two separate lockers for each asbestos worker, one in each locker room. Keep street clothing and street shoes in the clean locker. HEPA vacuum and remove asbestos contaminated disposable protective clothing while still wearing respirators at the boundary of the asbestos work area and seal in impermeable bags or containers for disposal. [HEPA vacuum and remove asbestos contaminated reusable protective clothing while still wearing respirators at the boundary of the asbestos work area, seal in two impermeable bags, label outer bag as asbestos contaminated waste, and transport for decontamination.] Do not wear work clothing between home and work. Locate showers between the decontamination locker room and the clean locker room and require that all employees shower before changing into street clothes. Collect used shower water and filter with approved water filtration equipment to remove asbestos contamination. Dispose of filters and residue as asbestos waste. Discharge clean water to the sanitary system. Dispose of asbestos contaminated work clothing as asbestos contaminated waste [or properly decontaminate as specified in the Contractor's Asbestos Hazard Abatement Plan]. Decontamination units shall be physically attached to the asbestos control area. Build both a personnel decontamination unit and an equipment decontamination unit onto and integral with each asbestos control area.

3.1.2.4 [Decontamination of Reusable Outer Protective Clothing

When reusable outer protective clothing is used, transport the double bagged clothing to a previously notified commercial/industrial decontamination facility for decontamination. Perform non-destructive testing to determine the effectiveness of asbestos decontamination. If representative sampling is used, ensure the statistical validity of the sampling results. If representative sampling is used, reject any entire batch in which any of the pieces exceed 40 fibers per square millimeter. Inspect reusable protective clothing prior to use to ensure that it will provide adequate protection and is not or is not about to become ripped, torn, deteriorated, or damaged, and that it is not visibly contaminated. Notify, in writing, all personnel involved in the decontamination of reusable outer protective clothing as indicated in 29 CFR 1926.1101.]

3.1.2.5 Eye Protection

Provide goggles to personnel engaged in asbestos abatement operations when the use of a full face respirator is not required.

3.1.3 Warning Signs and Labels

Provide [bilingual] warning signs [printed in English and [_____]] at all approaches to asbestos control areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos.

3.1.3.1 Warning Sign

Provide vertical format conforming to 29 CFR 1926.200, and 29 CFR 1926.1101 minimum 500 by 355 mm (20 by 14 inches) displaying the following legend in the lower panel:

Legend	Notation
Danger	25 mm (1-inch) Sans Serif Gothic or Block
Asbestos	25 mm (1-inch) Sans Serif Gothic or Block
Cancer and Lung Disease Hazard	6 mm (1/4-inch) Sans Serif Gothic or Block
Authorized Personnel Only	6 mm (1/4-inch) Gothic
Respirators and Protective Clothing are Required in this Area	6 mm (1/4-inch) Gothic

Spacing between lines shall be at least equal to the height of the upper of any two lines.

3.1.3.2 Warning Labels

Provide labels conforming to 29 CFR 1926.1101 of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
BREATHING ASBESTOS DUST MAY
CAUSE SERIOUS BODILY HARM

3.1.4 Local Exhaust System

NOTE: When a negative pressure enclosure is not required, delete the requirements for the local exhaust system and pressure differential recording.

Provide a local exhaust system in the asbestos control area in accordance with ANSI Z9.2 and 29 CFR 1926.1101 that will provide at least four air changes per hour inside of the negative pressure enclosure. Local exhaust equipment shall be operated 24 hours per day, until the asbestos control area is removed and shall be leak proof to the filter and equipped with HEPA filters. Maintain a minimum pressure differential in the control area of minus 0.51 mm (0.02 inch) of water column relative to adjacent, unsealed areas. Provide continuous 24-hour per day monitoring of the pressure differential with a pressure differential automatic recording instrument. In no case shall the building ventilation system be used as the local exhaust system for the asbestos control area. Filters on exhaust equipment shall conform to ANSI Z9.2 and UL 586. The local exhaust system shall terminate out of doors and remote from any public access or ventilation system intakes.

3.1.5 Tools

Vacuums shall be leak proof to the filter and equipped with HEPA filters. Filters on vacuums shall conform to ANSI Z9.2 and UL 586. Do not use power tools to remove asbestos containing materials unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation systems. Remove all residual asbestos from reusable tools prior to storage or reuse.

3.1.6 Rental Equipment

If rental equipment is to be used, furnish written notification to the rental agency concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

3.1.7 [Glovebags

NOTE: Include this paragraph if glovebag technique is permitted to be used in the project.

Submit written manufacturers proof that glovebags will not break down under expected temperatures and conditions.]

3.2 WORK PROCEDURE

NOTE: Use wet removal procedures in almost all cases. Wet removal is the preferred method and the least hazardous. Dry removal as an option can be used to allow the Contractor to use dry removal where wet removal may damage equipment or present an

extreme hazard. Dry removal as the only method of removal should only be specified if freezing is likely to occur, safety hazards preclude the use of water, or severe water damage to equipment, etc., would occur during wet removal. If dry removal alone is allowed, carefully edit the specification to remove all reference to amended water and wetting down procedures and to include a requirement for a written variance submitted by the Contractor along with the written approval of any regulatory authority having jurisdiction.

NOTE: Negative pressure enclosure and glovebag techniques pertain to the two most general but yet essentially different asbestos control techniques used for asbestos removal. Encapsulation work practice techniques are listed here, also. The use of unlisted removal work practice techniques will be acceptable if they are proven at least as safe as the listed practices. The appropriate technique depends on existing conditions, but must be that technique that provides the best control during abatement at most reasonable cost.

Perform asbestos related work in accordance with 29 CFR 1926.1101, 40 CFR 61-SUBPART M, and as specified herein. Use [[wet] [or] [if given prior EPA approval, dry] removal procedures] [appropriate encapsulation procedures as listed in the asbestos hazard abatement plan] and [negative pressure enclosure] [_____] techniques. Personnel shall wear and utilize protective clothing and equipment as specified herein. Eating, smoking, drinking, chewing gum, tobacco, or applying cosmetics shall not be permitted in the asbestos work or control areas. Personnel of other trades not engaged in the [encapsulation] [removal and demolition] of asbestos containing material shall not be exposed at any time to airborne concentrations of asbestos unless all the personnel protection and training provisions of this specification are complied with by the trade personnel. [Seal all roof top penetrations, except plumbing vents, prior to asbestos roofing work.] Shut down the building heating, ventilating, and air conditioning system, cap the openings to the system, [and provide temporary [heating,] [and] [ventilation,] [and] [air conditioning]] prior to the commencement of asbestos work. [Disconnect electrical service when [encapsulation] [wet removal] is performed and provide temporary electrical service with verifiable ground fault circuit interrupter (GFCI) protection prior to the use of any [water] [encapsulant].] If an asbestos fiber release or spill occurs [outside of the asbestos control area], stop work immediately, correct the condition to the satisfaction of the Contracting Officer including clearance sampling, prior to resumption of work.

3.2.1 Protection of Existing Work to Remain

NOTE: Normal practice is to have the Contractor hire one independent Private Qualified Person (the PQP) to perform all required functions. However, some applicable laws forbid this approach and will dictate when the PQP, the NC or both will be required to perform the function involved. However, the Contractor shall always hire a PQP.

Perform work without damage or contamination of adjacent work. Where such work is damaged or contaminated as verified by the Contracting Officer using visual inspection or sample analysis, it shall be restored to its original condition or decontaminated by the Contractor at no expense to the Government as deemed appropriate by the Contracting Officer. This includes inadvertent spill of dirt, dust, or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, stop work immediately. Then clean up the spill. When satisfactory visual inspection and air sampling results are obtained from the [PQP] [NC] work may proceed at the discretion of the Contracting Officer.

3.2.2 Furnishings

NOTE: Choose one of the following options. In most projects, the Government will remove furniture and equipment before the Contractor begins work. In this case the first paragraph should be used. The third paragraph should only be used when existing furnishings have been contaminated with asbestos fibers and the Contractor will be required to clean these items. When the third paragraph is used, identify the furnishings and indicate the quantity of each.

NOTE: The designer must decide if porous, non-solid surfaced items can be cleaned or must be disposed of as contaminated waste. If cleaning is chosen, specify methods.

[Furniture [(____)]] and equipment will be removed from the area of work by the Government before asbestos work begins.]

[Furniture [(____)]] and equipment will remain in the building. Cover and seal furnishings with 0.15 mm (6-mil) plastic sheet or remove from the work area and store in a location on site approved by the Contracting

Officer.]

[Furnishings listed below and located in the work area are considered to be contaminated with asbestos fibers. Transfer these items to an area on site approved by the Contracting Officer, decontaminate (wet methods where possible), and then store until the room from which they came is declared clean and safe for entry. [Carpets, draperies, and other items with porous, non-solid surfaces can not be suitably cleaned and shall be properly disposed of as contaminated waste.] At the conclusion of the asbestos removal work and cleanup operations, transfer all objects so removed and cleaned back to the area from which they came and re-install them. Base bids on decontaminating:

- a. [] Desks
- b. [] Filing cabinets
- c. [] Linear meters (feet) of shelving
- d. [] Cubic meters (feet) of books, papers, files, etc.
- e. []].

3.2.3 Precleaning

Wet wipe and HEPA vacuum all surfaces potentially contaminated with asbestos prior to establishment of an enclosure.

3.2.4 Asbestos Control Area Requirements

NOTE: When negative pressure enclosure is infeasible, use paragraph titled "Glovebag" and delete paragraph titled "Negative Pressure Enclosure." If the project has both areas which can be enclosed and areas which cannot be enclosed, retain the appropriate paragraphs and identify the areas which must be enclosed and the areas which cannot be enclosed.

3.2.4.1 Negative Pressure Enclosure

Block and seal openings in areas where the release of airborne asbestos fibers can be expected. Establish an asbestos negative pressure enclosure with the use of curtains, portable partitions, or other enclosures in order to prevent the escape of asbestos fibers from the contaminated asbestos work area. Negative pressure enclosure development shall include protective covering of uncontaminated walls, and ceilings with a continuous membrane of two layers of minimum 0.15 mm (6-mil) plastic sheet sealed with tape to prevent water or other damage. Provide two layers of

0.15 mm (6-mil) plastic sheet over floors and extend a minimum of 300 mm (12 inches) up walls. Seal all joints with tape. Provide local exhaust system in the asbestos control area. Openings will be allowed in enclosures of asbestos control areas for personnel and equipment entry and exit, the supply and exhaust of air for the local exhaust system and the removal of properly containerized asbestos containing materials. Replace local exhaust system filters as required to maintain the efficiency of the system.

3.2.4.2 [Glovebag

NOTE: Specify the asbestos material to be removed in the first blank and identify the location of the area which cannot be enclosed in the second blank.

The construction of a negative pressure enclosure is infeasible for the [removal] [encapsulation] of [_____] located [_____]. Use alternate techniques as indicated in 29 CFR 1926.1101. Establish designated limits for the asbestos regulated area with the use of rope or other continuous barriers, and maintain all other requirements for asbestos control areas. The PQP shall conduct personal samples of each worker engaged in asbestos handling (removal, disposal, transport and other associated work) throughout the duration of the project. If the quantity of airborne asbestos fibers monitored at the breathing zone of the workers at any time exceeds background or 0.01 fibers per cubic centimeter whichever is greater, stop work, evacuate personnel in adjacent areas or provide personnel with approved protective equipment at the discretion of the Contracting Officer. This sampling may be duplicated by the Government at the discretion of the Contracting Officer. If the air sampling results obtained by the Government differ from those obtained by the Contractor, the Government will determine which results predominate. If adjacent areas are contaminated as determined by the Contracting Officer, clean the contaminated areas, monitor, and visually inspect the area as specified herein.]

3.2.5 [Removal Procedures

NOTE: Choose "Removal Procedures" or "Encapsulation Procedures" as appropriate for the project.

Wet asbestos material with a fine spray of [amended water] [a specific wetting agent such as light oil] during removal, cutting, or other handling so as to reduce the emission of airborne fibers. Remove material and immediately place in 0.15 mm (6-mil) plastic disposal bags. Remove asbestos containing material in a gradual manner, with continuous application of the amended water or wetting agent in such a manner that no asbestos material is disturbed prior to being adequately wetted. Where

unusual circumstances prohibit the use of 0.15 mm (6-mil) plastic bags, submit an alternate proposal for containment of asbestos fibers to the Contracting Officer for approval. For example, in the case where both piping and insulation are to be removed, the Contractor may elect to wet the insulation, wrap the pipes and insulation in plastic and remove the pipe by sections. Asbestos containing material shall be containerized while wet. At no time shall asbestos material be allowed to accumulate or become dry. Lower and otherwise handle asbestos containing material as indicated in 40 CFR 61-SUBPART M.

3.2.5.1 Sealing Contaminated Items Designated for Disposal

NOTE: Use this paragraph only when asbestos contaminated items are also designated for removal and disposal.

Remove contaminated architectural, mechanical, and electrical appurtenances such as venetian blinds, full-height partitions, carpeting, duct work, pipes and fittings, radiators, light fixtures, conduit, panels, and other contaminated items designated for removal by completely coating the items with an asbestos lock-down encapsulant at the demolition site before removing the items from the asbestos control area. These items need not be vacuumed. The asbestos lock-down encapsulant shall be tinted a contrasting color. It shall be spray-applied by airless method. Thoroughness of sealing operation shall be visually gauged by the extent of colored coating on exposed surfaces. Lock-down encapsulants shall comply with the performance requirements specified herein.

3.2.5.2 Exposed Pipe Insulation Edges

Contain edges of asbestos insulation to remain that are exposed by a removal operation. Wet and cut the rough ends true and square with sharp tools and then encapsulate the edges with a 6 mm (1/4-inch) thick layer of non-asbestos containing insulating cement troweled to a smooth hard finish. When cement is dry, lag the end with a layer of non-asbestos lagging cloth, overlapping the existing ends by at least 100 mm (4 inches). When insulating cement and cloth is an impractical method of sealing a raw edge of asbestos, take appropriate steps to seal the raw edges as approved by the Contracting Officer.]

3.2.6 [Encapsulation Procedures

NOTE: Choose "Removal Procedures" or "Encapsulation Procedures" as appropriate for the project.

3.2.6.1 Preparation of Test Patches

NOTE: Prior to preparing plans and specifications for an encapsulation project, the designer will have to ascertain that encapsulation is feasible at all. The foremost design criteria is the soundness of the existing asbestos containing matrix, i.e. the bond of the matrix to the substrate and the shear strength of the matrix itself. The designer should test the existing matrix in accordance with the ASTM E 1494, using the Field Testing Provisions for the Adhesion Test.

NOTE: Exercise discretion on the number and location of Contractor applied test patches. However, a minimum of three test patches should always be specified. Test locations, in areas of the matrix, that have a different appearance or raise doubts about their homogeneity. Specify number of test patches in first bracket and location in second bracket. Also show location on drawings.

Install [three] [_____] test patches of encapsulant in [_____] , as indicated. Use airless spray at the lowest pressure and as recommended by the encapsulant manufacturer. Follow exactly the manufacturer's instructions for thinning recommendations, application procedures and rates. Curing time shall be not less than five days or that recommended by the manufacturer, whichever is more. A test patch shall be 0.8 square meter (9 square feet) in size.

3.2.6.2 Field Testing

Field test the encapsulation test patches in accordance with ASTM E 1494, paragraph "Required Field Test," in the presence of the Contracting Officer. Keep a written record of the testing procedures and test results. Upon successful testing of the encapsulant, submit a signed statement to the Contracting Officer certifying that the encapsulant is suitable for installation on the particular asbestos containing material.

3.2.6.3 Large-Scale Application

Apply encapsulant using the same equipment and procedures as employed for the test patches. Keep the encapsulant material stirred to prevent settling. Keep a clean work area. Change pre-filters in the ventilation equipment as soon as they appear clogged by encapsulant aerosol or pressure differential drops below 0.02 Hg.]

3.2.7 Air Sampling

NOTE: Air sampling regimen is very dependent on removal method and applicable laws, edit accordingly.

NOTE: Normal practice is to have the Contractor hire one independent Private Qualified Person (the PQP) to perform all required functions. However, some applicable laws forbid this approach and will dictate when the PQP, the NC or both will be required to perform the function involved. However, the Contractor shall always hire a PQP.

Sampling of airborne concentrations of asbestos fibers shall be performed in accordance with 29 CFR 1926.1101 and as specified herein. Sampling performed in accordance with 29 CFR 1926.1101 shall be performed by the PQP. [Sampling performed for environmental and quality control reasons shall be performed by the [PQP] [NC].] Unless otherwise specified, use NIOSH Method 7400 for sampling and analysis. Monitoring may be duplicated by the Government at the discretion of the Contracting Officer. If the air sampling results obtained by the Government differ from those results obtained by the Contractor, the Government will determine which results predominate.

3.2.7.1 Sampling Prior to Asbestos Work

Provide area air sampling and establish the baseline one day prior to the masking and sealing operations for each [demolition] [removal] [encapsulation] site. Establish the background by performing area sampling in similar but uncontaminated sites in the building.

3.2.7.2 Sampling During Asbestos Work

NOTE: Choose one of the following options. Normal practice is to have the Contractor hire one independent Private Qualified Person (the PQP) to perform all required functions. However, some applicable laws forbid this approach and will dictate when the PQP, the NC or both will be required to perform the function involved. However, the Contractor shall always hire a PQP.

NOTE: When an "enclosed" asbestos control area is not required, retain the appropriate portion in brackets.

[The PQP shall provide personal and area sampling as indicated in 29 CFR 1926.1101 and governing environmental regulations. In addition, provided the same type of work is being performed, provide area sampling at least once every work shift close to the work inside the enclosure, outside the clean room entrance to the enclosure, and at the exhaust opening of the local exhaust system. If sampling outside the enclosure shows airborne levels have exceeded background or 0.01 fibers per cubic centimeter, whichever is greater, stop all work, correct the condition(s) causing the increase, and notify the Contracting Officer immediately. [Where alternate methods are used, perform personal and area air sampling at locations and frequencies that will accurately characterize the evolving airborne asbestos levels.]]

[The PQP shall provide personal sampling as indicated in 29 CFR 1926.1101. At the same time the NC will provide area sampling close to the work inside the enclosure, outside the clean room entrance to the enclosure, and at the exhaust opening of the local exhaust system. In addition, provided the same type of work is being performed, the NC will provide area sampling once every work shift close to the work inside the enclosure, outside the clean room entrance to the enclosure, and at the exhaust opening of the local exhaust system. If sampling outside the enclosure shows airborne levels have exceeded background or 0.01 fibers per cubic centimeter, whichever is greater, stop all work, correct the condition(s) causing the increase, and notify the Contracting Officer immediately. [Where alternate methods are used, perform personal and area air sampling at locations and frequencies that will accurately characterize the evolving airborne asbestos levels.]]

3.2.7.3 Sampling After Final Clean-Up (Clearance Sampling)

NOTE: The designer shall research the State, regional and local laws, regulations, statutes, etc., to determine whether "aggressive" air sampling is required. However, always use aggressive air sampling techniques after encapsulation type abatement efforts.

NOTE: Normal practice is to have the Contractor hire one independent Private Qualified Person (the PQP) to perform all required functions. However, some applicable laws forbid this approach and will dictate when the PQP, the NC or both will be required to perform the function involved. However,

the Contractor shall always hire a PQP.

NOTE: The designer shall research the State, regional and local laws, regulations, statutes, etc., to determine whether TEM analysis is required and the number of samples required.

Provide area sampling of asbestos fibers [using aggressive air sampling techniques as defined in the EPA 560/5-85-024] and establish an airborne asbestos concentration of less than 0.01 fibers per cubic centimeter after final clean-up but before removal of the enclosure or the asbestos work control area. After final cleanup and the asbestos control area is dry but prior to clearance sampling, the [PQP] [and] [NC] shall perform a visual inspection in accordance with ASTM E 1368 to ensure that the asbestos control and work area is free of any accumulations of dirt, dust, or debris. [Prepare a written report signed and dated by the PQP documenting that the asbestos control area is free of dust, dirt, and debris and all waste has been removed.] [Perform at least [_____] samples.] [Use transmission electron microscopy (TEM) to analyze clearance samples and report the results in accordance with current NIOSH criteria.] The asbestos fiber counts from these samples shall be less than 0.01 fibers per cubic centimeter or be not greater than the background, whichever is greater. Should any of the final samples indicate a higher value, the Contractor shall take appropriate actions to re-clean the area and shall repeat the sampling and [TEM] analysis at the Contractor's expense.

3.2.8 Lock-Down

Prior to removal of plastic barriers and after pre-clearance clean up of gross contamination, the [PQP] [NC] shall conduct a visual inspection of all areas affected by the [removal] [encapsulation] in accordance with ASTM E 1368. Inspect for any visible fibers [, and to ensure that encapsulants were applied evenly and appropriately]. [A post removal (lock-down) encapsulant shall then be spray applied to ceiling, walls, floors and other areas exposed in the removal area. The exposed area shall include but not be limited to plastic barriers, furnishings and articles to be discarded as well as dirty change room, air locks for bag removal and decontamination chambers.]

3.2.9 Site Inspection

While performing asbestos engineering control work, the Contractor shall be subject to on-site inspection by the Contracting Officer who may be assisted by or represented by safety or industrial hygiene personnel. If the work is found to be in violation of this specification, the Contracting Officer or his representative will issue a stop work order to be in effect immediately and until the violation is resolved. All related costs including standby time required to resolve the violation shall be at the

Contractor's expense.

3.3 CLEAN-UP AND DISPOSAL

3.3.1 Housekeeping

Essential parts of asbestos dust control are housekeeping and clean-up procedures. Maintain surfaces of the asbestos control area free of accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris; keep waste from being distributed over the general area. Use HEPA filtered vacuum cleaners. **DO NOT BLOW DOWN THE SPACE WITH COMPRESSED AIR.** When asbestos removal is complete, all asbestos waste is removed from the work-site, and final clean-up is completed, the Contracting Officer will attest that the area is safe before the signs can be removed. After final clean-up and acceptable airborne concentrations are attained but before the HEPA unit is turned off and the enclosure removed, remove all pre-filters on the building HVAC system and provide new pre-filters. Dispose of filters as asbestos contaminated materials. Reestablish HVAC mechanical, and electrical systems in proper working order. The Contracting Officer will visually inspect all surfaces within the enclosure for residual material or accumulated dust or debris. The Contractor shall re-clean all areas showing dust or residual materials. If re-cleaning is required, air sample and establish an acceptable asbestos airborne concentration after re-cleaning. The Contracting Officer must agree that the area is safe in writing before unrestricted entry will be permitted. The Government shall have the option to perform monitoring to determine if the areas are safe before entry is permitted.

3.3.2 Title to Materials

All waste materials, except as specified otherwise, shall become the property of the Contractor and shall be disposed of as specified in applicable local, State, and Federal regulations and herein.

3.3.3 Disposal of Asbestos

NOTE: Disposal procedures and sites for asbestos materials vary considerably with each location. Contact local station Public Works and the NAVFAC Engineering Field Division Hazardous Waste Manager or Industrial Hygienist for local procedures.

3.3.3.1 Procedure for Disposal

Collect asbestos waste, asbestos contaminated water, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers and place in sealed fiber-proof, waterproof, non-returnable containers (e.g. double plastic bags 0.15 mm (6-mils) thick, cartons, drums or cans). Wastes within the containers

must be adequately wet in accordance with 40 CFR 61-SUBPART M. Affix a warning and Department of Transportation (DOT) label to each container including the bags or use at least 0.15 mm (6-mils) thick bags with the approved warnings and DOT labeling preprinted on the bag. The name of the waste generator and the location at which the waste was generated shall be clearly indicated on the outside of each container. Prevent contamination of the transport vehicle (especially if the transport vehicle is a rented truck likely to be used in the future for non-asbestos purposes). These precautions include lining the vehicle cargo area with plastic sheeting (similar to work area enclosure) and thorough cleaning of the cargo area after transport and unloading of asbestos debris is complete. Dispose of waste asbestos material at an Environmental Protection Agency (EPA) or State-approved asbestos landfill off Government property. For temporary storage, store sealed impermeable bags in asbestos waste drums or skids. An area for interim storage of asbestos waste-containing drums or skids will be assigned by the Contracting Officer or his authorized representative. Procedure for hauling and disposal shall comply with 40 CFR 61-SUBPART M, State, regional, and local standards. Sealed plastic bags may be dumped from drums into the burial site unless the bags have been broken or damaged. Damaged bags shall remain in the drum and the entire contaminated drum shall be buried. Uncontaminated drums may be recycled. Workers unloading the sealed drums shall wear appropriate respirators and personal protective equipment when handling asbestos materials at the disposal site.

3.3.3.2 Asbestos Disposal Quantity Report

NOTE: Normal practice is to have the Contractor hire one independent Private Qualified Person (the PQP) to perform all required functions. However, some applicable laws forbid this approach and will dictate when the PQP, the NC or both will be required to perform the function involved. However, the Contractor shall always hire a PQP.

[Direct the PQP to record and report, to the Contracting Officer, the amount of asbestos containing material removed and released for disposal. Deliver the report for the previous day at the beginning of each day shift with amounts of material removed during the previous day reported in linear meters or square meters (linear feet or square feet) as described initially in this specification and in cubic meters (feet) for the amount of asbestos containing material released for disposal.]

[Allow the NC to inspect, record and report the amount of asbestos containing material removed and released for disposal on a daily basis.]

NOTE: Suggestions for improvement of this specification will be welcomed using the Navy "Change Request Forms" subdirectory located in SPECSINTACT in Jobs or Masters under "Forms/Documents" directory or DD Form 1426. Suggestions should be forwarded to:

Commanding Officer
Naval Construction Battalion Center
NAVFAC 15G/CESO 158
1000 23rd Avenue
Port Hueneme, CA 93043-4301

-- End of Section --

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Appendix D

Glossary

Acoustical Plaster Sound absorbing finishing material mill-formulated for application in areas where a reduction in sound reverberation or noise intensity is desired. These materials usually are applied in a minimum thickness of ½" (13 mm). The finish material is applied over gypsum plaster, plaster brown coat or other base plaster. The surface material is usually friable and has a rough surface appearance.

Acoustic Tile Tile-shaped blocks of sound absorbent material used for ceilings or as wall facing. May be glued to substrate or laid in a rigid grid work.

ACM (ACBM) Asbestos-Containing Material (Asbestos-containing Building Material). Any material containing more than one percent asbestos.

Adequately Wet Adequately Wet means sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions are observed coming from asbestos-containing material, then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wet.

AHERA Asbestos Hazard Emergency Response Act

AIA American Institute of Architects

Air Monitoring The process of measuring the fiber content of a specific volume of air.

Amended Water Water to which a surfactant has been added for use in wetting ACM to control asbestos fibers.

APM Asbestos Program Manager

Asbestos Chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos and any of these minerals that

has been chemically treated and/or altered.

Asbestos-Containing Waste Material Mill tailings or any waste that contains commercial asbestos and is generated by a source regulated under NESHAP. This term includes filters from control devices, friable asbestos waste material, and bags or other similar packaging contaminated with commercial asbestos. As applied to demolition and renovation operations, this term also includes regulated asbestos-containing waste and materials contaminated with asbestos including disposable equipment and clothing.

Asbestos debris Pieces of ACBM that can be identified by color, texture, or composition, or means dust, if the dust is determined by an accredited inspector to be ACM.

Asbestos Hazard Emergency Response Act (AHERA) An EPA regulation published in the October 30, 1987 Federal Register covering asbestos-containing materials in schools. AHERA requires local education agencies to identify ACM in their school buildings, develop an asbestos management plan and implement this plan. An O&M program is one permitted response action, where appropriate.

Asbestos O&M Work Cleaning, maintenance, repair or renovation work involving asbestos containing materials where the intent of the activity is not to remove asbestos. NESHAP requires that the owner or operator of a demolition or renovation activity conduct a thorough inspection of the affected facility or part of the facility where demolition or renovation will occur.

Asbestos Program Manager (APM) A building owner or

designated representative who supervises all aspects of the facility asbestos management and control program.

Breathing Zone A hemisphere forward of the shoulders with a radius of approximately 6" to 9" (150-250 mm).

Bridging encapsulant An encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.

CFR Code of Federal Regulations

Clerk-of-the-works A representative of the architect or owner who oversees construction, handles administrative matters, and ensures that the construction is in accordance with the contract documents.

Competent Person means, in addition to the definition in 29 CFR 1926.32 (f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32(f): in addition, for Class I and Class II work one who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR part 763) for supervisor, or its equivalent and, for Class III and Class IV work, who is trained in a manner consistent with EPA requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92 (a)(2).

Compliance Instruction (Compliance Directive)

Instruction issued by OSHA to establish policies and provide clarification to ensure uniform enforcement of OSHA standards.

Concealed Suspension or Concealed Spline Ceiling

System Presents a monolithic ceiling surface, unobstructed by the cross-hatching of exposed grid members. Tiles are typically 12" x 12" (300 x 300 mm) or 12" x 24" (300 x 600 mm) with slots or kerfs cut into the edges of tiles for the purposes of accepting flat or "T" splines to support the tiles.

Confined Space A space that has limited openings for entry and exit, unfavorable natural ventilation and/or a space not designed for continuous worker occupancy. Examples include boilers, furnaces, pits, septic tanks, manholes, silos and utility vaults.

Critical Barrier One or more layers of polyethylene taped in place over openings into a work area. Openings to be covered include doors, windows, diffusers, and any other opening that could allow outside air into a work area.

CSRF Construction Sciences Research Foundation

Decorative Acoustic Finish:

Finishing material mill-formulated and spray applied up to about 3/8" (10 mm) thick over gypsum wallboard. Material has a rough surface and is similar in appearance to acoustic plaster but is not designed for sound absorption.

Delamination Separation of one layer from another.

Disposal Bag Properly labeled 6 mil (0.15 mm) thick (or thicker) leak-tight plastic bags used for transporting asbestos waste from work and to disposal site.

Drop Cloth A layer of polyethylene on the floor of a work area to protect the floor below from contamination and to facilitate the clean-up of dust or debris generated during the work.

EJCDC Engineers Joint Contract Documents Committee

EL See Excursion Limit

Encapsulant A material that surrounds or embeds asbestos fibers in an adhesive matrix, to prevent release of fibers.

Enclosure The construction of an air-tight, impermeable, permanent barrier around asbestos-containing material to control the release of asbestos fibers into the air.

EPA U.S. Environmental Protection Agency

Excursion Limit (EL) The OSHA term used to define a maximum airborne concentration of asbestos in fibers per cubic centimeter as averaged over a sampling period of thirty minutes.

Fiber Release Any uncontrolled or unintentional disturbance of ACBM resulting in visible emission.

Fireproofing Material applied to structural elements or systems which provides increased fire resistance, usually serving no structural function. This material is typically applied using spray equipment.

Friable Asbestos (See "Regulated ACM").

Glovebag A polyethylene or polyvinyl chloride bag-like enclosure affixed around an asbestos-containing source (most often, TSI) so that the material may be removed while minimizing release of airborne fibers to the surrounding atmosphere.

HEPA Filter High-Efficiency Particulate Air Filter. Such filters are rated to trap at least 99.97% of all particles 0.3 microns (0.3 μm) in diameter or larger.

HMR Hazardous Material Rules under Dept of Transportation regulations.

MAP EPA Interim Final Model Accreditation Plan (MAP) for asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

Medical Surveillance A periodic comprehensive review of a worker's health status. The required elements of an acceptable medical surveillance program are listed in the Occupational Safety and Health Administration standards for asbestos.

Mini-Enclosure An enclosure constructed of polyethylene sheeting used for small scale, short duration asbestos maintenance or renovation work. Mini-enclosures can be small enough to restrict entry to the asbestos work area to one worker. Appendix G to OSHA regulation 29 CFR 1926.58 discusses mini-enclosures and recommends that a change room be constructed contiguous to the mini-enclosure.

Miscellaneous ACM Interior asbestos-containing building material on structural components, structural members or fixtures, such as floor and ceiling tiles; does not include surfacing material or thermal system insulation.

NEA Negative Exposure Assessment

Negative Exposure

Assessment A demonstration by the employer which complies with criteria in paragraph (f)(2)(iii) of 29 CFR 1926.1101, that employee exposure during an operation is expected to be consistently below the PELs.

Negative Pressure System A local exhaust system intended to prevent the escape of contaminated air to the surrounding environment. It utilizes HEPA filtration capable of maintaining a pressure differential with a lower pressure inside the Work Area than in any adjacent area. This system recirculates clean air and/or generates a constant flow of air from adjacent areas into the work area.

Negative Pressure Respirator

A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.

NESHAP National Emission Standard for Hazardous Air Pollutants - EPA Rules under the Clean Air Act (40 CFR Part 61).

NIOSH The National Institute for Occupational Safety and Health, which was established by the Occupational Safety and Health Act of 1970. Primary functions of NIOSH are to conduct research, issue technical information, and certify respirators.

O&M Operations & Maintenance
Operations & Maintenance (O&M) Program A program of work practices to maintain ACM in good condition, ensure clean up of asbestos fibers previously released, and prevent further release by minimizing and controlling ACM disturbance or damage.

Occupied Area An area where personnel are present and are performing their normal activities intended for the area (such as in a typical office area from 8:00 to 5:00 p.m., Monday through Friday).

OSHA Occupational Health & Safety Administration.

PAPR Powered Air Purifying Respirator.

Penetrating Encapsulant An encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.

PELs Permissible Exposure Limits.

Personal Air Samples An air sample taken with a sampling pump directly attached to the worker with the collecting filter and cassette placed in the worker's breathing zone. These samples are required by the OSHA asbestos standards and the EPA Worker Protection Rule.

PCM Phase Contrast Microscopy
Phase Contrast Microscopy (PCM) A method of analysis using a light microscope, used to find the concentration of airborne fibers. Does not distinguish among asbestos and other fibers. Used by OSHA to find personal exposures, and by EPA to find area levels for AHERA project clearance.

Plenum Any space to convey air in a building or structure. The space above a suspended ceiling is often used as an air plenum. This term is also used in the work practices to refer to spaces above a ceiling not used to convey air.

PLM Polarized Light Microscopy
Polarized Light Microscopy (PLM) A method of analysis using a light microscope to find the chemical or mineral types of samples, including the concentration of asbestos in bulk materials. Used by EPA for AHERA and NESHAP, and by OSHA to see if asbestos is involved in a project.

Project Representative Architect's representative at the project site who assists in the administration of the construction contract.

Protection Factor The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.

RCRA Resource Conservation and Recovery Act.

RACM Regulated ACM

Regulated ACM (RACM) As defined by NESHAP in the November 20, 1990 Federal Register, **regulated asbestos-containing material (RACM)** means (a) Friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations regulated by this subpart.

(**Note:** Regulated ACM is an EPA NESHAP concept. OSHA makes no

distinction between friable and non-friable asbestos).

"Cutting" means to penetrate with a sharp-edged instrument and includes sawing, but does not include shearing, slicing or punching.

"Grinding" means to reduce powder or small fragments and includes mechanical clipping or drilling.

Friable asbestos material

means any material containing more than 1 percent asbestos as determined using the method specified under AHERA (40 CFR Part 763, Sub-part F, Appendix A, section 1, Polarized Light Microscopy) that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. If the asbestos content is less than 10 percent as determined by a method other than point counting by polarized light microscopy (PLM), verify the as-bestos content by point counting using PLM.

Category I nonfriable asbestos-containing material (ACM) means asbestos-containing packings, gaskets, resilient floor covering and asphalt roofing products containing more than 1 percent asbestos as determined using the method specified under AHERA.

Category II nonfriable ACM means any material, excluding Category I nonfriable ACM, containing more than 1 percent asbestos as determined using the methods specified under AHERA, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Remove For Operations and Maintenance work on ACM, "remove" refers to the removal of ACM as needed to perform a maintenance or repair O & M activity.

Removal Encapsulant A penetrating encapsulant specifically

designed to minimize fiber release during removal of asbestos-containing materials rather than for in situ encapsulation.

Repair Returning damaged ACBM to an undamaged condition or to an intact state so as to prevent fiber release.

Respirator A device designed to protect the wearer from the inhalation of harmful particulates.

Small-scale, Short-duration

Term formerly used by OSHA to describe O&M work activities (in the previous OSHA construction standard). This term has been superseded by the work class definitions in the current OSHA standard.

Surfacing ACM Asbestos-containing material that is sprayed-on, troweled-on or otherwise applied to surfaces, such as acoustical plaster on ceilings and fireproofing materials on structural member, or other materials on surfaces for acoustical, fireproofing, or other purposes.

Survey An asbestos survey is what EPA calls an inspection in the AHERA regulation. It consists of a visual and tactile inspection of a building to identify, quantify and assess the accessibility and condition of the ACM and suspected ACM present.

Suspended "T" Bar Ceiling

System A false or dropped ceiling composed of acoustic tiles laid into an inverted metal "T" bar grid frame suspended by wires from building framing members.

Surfactant A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

TEM Transmission Electron Microscopy

Temporary Barriers One or more layers of 6 mil polyethylene installed to isolate a work area from other portions of a facility.

Thermal System Insulation

(TSI) Thermal system insulation - asbestos-containing material applied to pipes, fittings, boilers, breeching, tanks, ducts or other interior structural components to prevent heat loss or gain or water condensation.

Time Weighted Average (TWA)

In air sampling, this refers to the average air concentration of contaminants during a particular time period.

TSI Thermal System Insulation

Transmission Electron

Microscopy (TEM) A method of analysis using an electron microscope, used to find and analyze the concentration of airborne or bulk asbestos fibers and structures.

Distinguishes among asbestos and other materials; can detect smaller asbestos fibers than does PCM. Used by EPA to find area concentrations for large AHERA project clearance.

TSCA Toxic Substances Control Act

TWA Time Weighted Average.

Work Area The area where asbestos-related work or removal operations are performed which is defined and/or isolated to prevent the spread of asbestos dust, fibers or debris, and entry by unauthorized personnel.

Work Practices Procedures designed to be followed to avoid or minimize fiber release during activities affecting ACM.

Appendix E

Minority Opinions

Minority opinions by project committee members are permitted under the consensus rules of the Institute. Minority opinions must pertain to issues addressed in the members' ballot comments and be judged by the project committee to be relevant to the scope of the project. The relevant comments were evaluated at a meeting of the project committee and categorized as persuasive, non-persuasive, or editorial. The minority opinions contained herein address comments judged to be non-persuasive by the project committee. Comments judged to be persuasive and editorial have been incorporated into the text.

The minority opinions contained in this appendix are solely those of the authors. These statements may, or may not, represent the opinions of the organizations with which the authors are affiliated. Neither the project committee nor the Institute has verified the accuracy of facts and statements contained in the minority opinions, and furthermore none of the minority opinions represent the consensus of the project committee.

The address and telephone number of the members submitting minority opinions are listed at the end of this appendix.

Minority Opinion Authors & Organizations

Walter D. Anderson
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James Fite
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717/396-2758

The Resilient Floor Covering Institute (RFCI) is a national trade association the members of which are manufacturers of vinyl tile and sheet vinyl.

The White Lung Association is a national, non-profit association which represents former asbestos workers and other persons with asbestos-related health problems and legal claims.

Armstrong World Industries, Inc. is a manufacturer of interior furnishings, including interior furnishings, including resilient floorcovering, acoustical ceilings, ceramic tile, and furniture, headquartered in Lancaster, PA.

**Minority
Opinion**

Walter D. Anderson; Resilient Floor Covering Institute
William H. Freeman, Jr.; Armstrong World Industries, Inc.

Subject

Consideration of critical barriers in Section 02085.

Objection We believe it is imprudent to suggest to the user of this manual that "if there is a possibility that the work may result in elevated asbestos levels" that critical barriers may be specified.

Rationale This section of the Model Guide Specification deals with the nonaggressive removal of "intact" resilient flooring materials using a Negative Exposure Assessment (NEA) as outlined in the revised OSHA Asbestos Standard. Where there may

be elevated levels of airborne asbestos fibers, or it is likely that the existing floor will become friable, then the work practices in Section 02085 should not be used. You cannot simply erect critical barriers and continue to rely on an NEA where you have not determined (1) that the material is not friable (or intact), and (2) the material is likely to remain non-friable (or intact) throughout the removal process.

Recommended Alternatives Do not provide this poor advice to the user of this manual.

**Minority
Opinion**

James Fite; White Lung Association

Subject

Reference of Navy Asbestos specification.

Objection The Navy specification should not be listed by the NIBS document because it does not address the hazardous nature of asbestos. The Navy has historically been very lax in regard to safety of both military and civilian personnel in relation to asbestos. The performance specification does not recognize the hazards of asbestos exposure and is not equal in quality to the NIBS specification. Use of the Performance (Navy) Standard may result in further civilian or military casualties from asbestos exposure. The Navy should use the NIBS spec instead of NIBS giving a reference to this incomplete and inadequate specification.

The NIBS specification refers to the hazards of asbestos (page 01013-5) in a manner which does not give the reader a knowledge of the hazardous nature of asbestos. The NIBS spec should clearly state that 1) there is no known safe level of asbestos exposure; 2) asbestos exposure can cause asbestosis, lung cancer, mesothelioma, various site cancers, heart attacks, infections and auto-immune responses; 3) past asbestos exposure in the United States is now showing over 12,000 excess cancer deaths each year; 4) the reason for this specification is primarily to prevent asbestos exposure amongst the work force and the general public.

Recommended Alternatives Remove the reference to the Navy specification.

SPECIFICATION SECTIONS

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Removal - Specification Sections

The specification sections listed below are those which are normally required, or may be required, for a comprehensive specification for asbestos removal work.

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Encapsulation - Specification Sections

The specification sections listed below are those which are normally required, or may be required, for a comprehensive specification for encapsulation work.

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Division 2 - Site Work

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Division 9 - Finishes

- 09251 Gypsum Drywall - Asbestos Enclosure

In addition to gypsum drywall, materials such as masonry, metal panels, wood, and plastic can be used to construct effective enclosures. Concrete is frequently used as a soil enclosure. If these or other effective materials are used, the appropriate sections should be added to the specification.

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The specification sections listed below are those which are normally required, or may be required, for a comprehensive specification for operation & maintenance work.

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SECTION 01013 SUMMARY OF WORK - ASBESTOS ABATEMENT

This section is based on the MasterSpec® section 01010 - “Summary of Work.” The evaluation for that section has a much more detailed discussion of the issues involved with this section. Refer to MasterSpec® for more information.

This Section is the key element in Division 1 because it provides information all parties involved in the construction process need.

- It amplifies the broad provisions in the Agreement and General Conditions by summarizing the Work required by the Contract Documents.
- It describes the Project, identifies the Owner and the Designer, and defines the responsibilities and duties of the Contractor.
- It identifies the type of Contract
- The Section also describes requirements for such important items as restrictions on the Contractors use of the premises and, if necessary, defines requirements governing work to be constructed in phases.
- Finally, it provides a place to specify special owner requirements for partial occupancy. This is particularly important for those asbestos abatement projects where the building will be occupied during the projects.

ASBESTOS ABATEMENT

There are several issues particular to asbestos abatement projects that are covered in this section. The Contractor is informed about the presence of asbestos-containing materials on the jobsite and warned about the potential health risk associated with disturbance of ACM.

The Contractor is told about the requirement to stop work if there is a problem with the abatement process. **NOTE:** This requires changes to the Owner-Contractor Agreement, and General and Supplementary Conditions. See the discussion later in this evaluation.

WORK COVERED BY CONTRACT DOCUMENTS

This article gives the reader an overview of the Project by summarizing the Project’s principal elements. It augments information contained in the Bid Documents. The Article describes and locates the Project, and it identifies the Owner and Designer. It should also include a brief description of the principal requirements of the Work. The Project description should be complete, but in broad terms. A detailed description is not required and should be avoided;

nevertheless, the description must be clear enough so that the reader can visualize the entire Work quickly.

Every paragraph in this Article must be written specifically for this Project. It is not practical to provide sample text for this Article because the variables are endless. Instead, the Section Text provides an outline specifiers may use to convey required information. Follow instructions in the

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editors notes closely and insert appropriate text where indicated. In some cases, it is necessary to add supplemental information to describe the Work covered by the Contract Documents.

Generally the abatement contractor will be a single prime contractor. If the abatement contractor will be one of several prime contractors working on the job there are issues of coordination and supervision that must be addressed. Refer to the MasterSpec section "Summary of Work - Multiple

Prime Contracts," if the project involves more than one prime contract. If the asbestos abatement contractor is to be a sub-contractor to a general contractor, this section will need to be completely revised to clearly delineate the relationship between the prime and sub-contractor.

The text in the box below is an example of how this Article might be used to describe the imaginary project in the rest of this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The Project consists of a Renovation of the Selikoff High School, Phase A - Asbestos Abatement and Selected Demolition.

1. **Project Location:** Selikoff High School, 123 Mt. Sinai Drive, Small Apple, NY
2. **Owner:** Anthophylite Central School District, 456 Amphibole Ave, Small Apple, NY

B. Contract Documents, dated July 7, 1996 were prepared for the Project by Jefferson Environmental Consultants, 76 Declaration Drive, Monticello, NY

C. The Work consists of asbestos removal and selected demolition work in the auditorium and music practice rooms at Selikoff High School.

1. **The Work** includes the removal of the asbestos-containing acoustical plaster ceiling in the auditorium, including the removal of the lath and framework supporting the ceiling. The existing hanger straps are to be cleaned and left in place. The existing catwalk system is to be cleaned and left in place.
2. **Scaffolding** is to be provided to allow access to the ceiling in the auditorium. This scaffolding is to be left in place at the completion of asbestos abatement work for use by others.
3. **Demolition above ceilings:** Suspended acoustical tile ceilings, lighting, ductwork, piping and asbestos-containing fireproofing are to be removed in the music practice rooms. New non-asbestos-containing fireproofing is to be provided.

D. The Work will be constructed under a single prime contract.

WORK UNDER OTHER CONTRACTS

Retain this article if work under this contract

depends on successful completion of work

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performed under other contracts and vice versa. The owner may, for example, find it expedient to have a demolition contractor perform general demolition work prior to specialized asbestos abatement related demolition. The terms “other contracts” and “separate contracts” as used in this article are different from “multiple prime contracts.”

Preparatory Work: Work from a previous contract or by the Owner that is scheduled to be substantially complete before work under this Contract begins. This can include operations such as moving furniture before the abatement starts, or contracted demolition that will not impact on asbestos-containing installations.

Multiple prime contracts must work together and coordinate their activities. If the project involves multiple prime contracts refer to the MasterSpec section “Summary of Work - Multiple Prime Contracts.” Separate, or other, contracts are always independent of the work of the asbestos abatement contract.

The text in the box below is a sample of the kind of language that can be used if work of a separate contract will precede the asbestos abatement work. Revise as required by project specifics, or delete if there are no separate contracts that are expected to be completed before work of this contract begins.

1.3 WORK UNDER OTHER CONTRACTS

A. Separate Contract: The Owner has awarded a separate contract for performance of certain construction operations at the site. Those operations are scheduled to be substantially complete before work under this Contract begins. The separate contract includes the following:

1. **Moving:** A separate contract has been awarded to Midnight Moving and Storage for removal and storage of all seating, desks and other furniture
2. **Demolition:** A separate contract has been awarded to Acme Demolition, Inc. for interior demolition work that includes removal of seating, and carpeting from the auditorium; stage curtains, stage rigging, stage lighting from the stage; and built in wooden risers and casework from the music practice rooms.

Concurrent Work: There could be other contractors working while the abatement work is in progress. This could be a demolition contractor or other contractor doing work in preparation for later renovation work. Anticipate problems when two or more contractors must perform their activities simultaneously. When possible, avoid concurrent performance of separate contracts. Use this article to assure cooperation between the contractors if concurrent contracts are

unavoidable.

The text in the box below is a sample of the kind of language that can be used if work of a separate contract will be conducted concurrently with the asbestos abatement work.

1.3 WORK UNDER OTHER CONTRACTS

- A. Separate Contract:** The Owner has awarded separate contracts for performance of certain construction operations at the site. Those operations will be conducted simultaneously with work under this Contract. Those Contracts includes the following:
- 1. Demolition:** A separate contract has been awarded to Rip-N-Run Demolition to demolish the "B Wing." This work will be in progress during the asbestos abatement work.
 - 2. Plumbing:** A separate contract has been awarded to ABC Plumbing to install a new hot water heater isolation valve in the boiler room. This may cause temporary interruptions of the hot water supply.
- B. Cooperate** fully with separate contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

Future Work: Asbestos abatement work is frequently part of the demolition portion of a renovation project. The success of the renovation work may depend on proper completion of the asbestos abatement work. Retain this article if work under a future contract depends on successful completion of work performed under this contract.

The text in the box below is a sample of the kind of language that can be used if work of a separate contract depends on successful completion of the asbestos abatement work. In the example given, the original ceiling hangers are being reused to support the new ceiling. The asbestos abatement contractor must avoid damaging these hangers during removal of the existing ceiling. Revise as required by project specifics, or delete if there are no separate contracts that will be performed after work of this contract.

- A. Future Contract:** The Owner has awarded a separate contract for additional work to be performed at the site following Substantial Completion. Completion of that work depends on successful completion of preparatory work under this Contract. The Contract for future work includes the following:
- 1. New auditorium ceiling.** A separate contract has been awarded to XYZ Acoustics to install a new acoustical plaster ceiling in the auditorium after asbestos removal work is complete. The hangers for the existing ceiling will be reused for the new ceiling. Leave hangers in place. Use care during asbestos abatement to avoid damaging ceiling hangers.

WORK SEQUENCE

Many projects are built using phased construction. Phased construction involves dividing the project into separate segments. Phases usually have different start and completion dates. Sometimes the start of one phase depends upon the completion of another. Consultation with the owner (and with an experienced contractor) is usually necessary to establish realistic completion dates for each phase. If completion of a phase is critical to the owner's use of the facility,

liquidated damages could be applied on a phased basis.

The text in the box below is an example of the type of language used to describe phasing requirements. Revise as necessary for project specifics or delete altogether if there is no phasing.

1.5 WORK SEQUENCE

A. **The Work** will be conducted in 2 phases.

1. **Phase 1** includes asbestos removal in the auditorium. Work of this phase shall be substantially complete, ready for reoccupancy within 45 calendar days of commencement of construction.
2. **Phase 2** includes asbestos removal in the stage areas and music practice rooms. Work of this phase shall begin 14 calendar days after substantial completion of phase 1, and shall be substantially complete and ready for re-occupancy within 25 calendar days of commencement of work on phase 2.

ASBESTOS-CONTAINING MATERIALS

OSHA requires that the owner notify the contractor about the presence, location and quantity of asbestos-containing material (ACM) or presumed asbestos-containing material (PACM) in the work site. This article makes this notification. Care should be used to insure that location and quantity of the ACM is unambiguously set forth. Generally, the best way of doing this is with architectural and or mechanical drawings. However, in some instances a schedule may be adequate for this purpose. The notification should describe the type of asbestos and concentration for all ACM involved in the work. This information helps the contractor estimate the type of respiratory protection required and man-hours

of effort needed for removal. The presence of amphiboles (usually amosite or crocidolite) in a material will make it more difficult to wet and hence will make the work more dusty. The concentration of asbestos in a material is related to airborne asbestos levels (though not necessarily to overall dust levels).

Potential Asbestos Health Risk: This article warns the Contractor about the potential health risk from disturbance of ACM. It also requires the Contractor to make notification to subcontractors and others at the work site.

AIR MONITORING BY THE OWNER

This article is intended to explain to the contractor how air monitoring will be done by the owner. It is not intended to specify methods to be used by the air monitoring firm. This article should be edited with assistance from the environmental consulting firm hired to perform air sampling for the owner.

This section is based on the presumption that the owner will have engaged the services of a competent project administrator and a competent air monitoring technician who will be at the job site. This may be one person or several depending on project organization and complexity. This section also assumes that the environmental monitor is the same entity as the designer.

Both the owner and the contractor will be taking air samples during the work, but for different purposes and frequently using different methods. Generally the owner takes air samples for quality assurance and to resolve problems quickly and prevent the spread of contamination beyond the work area. This is best accomplished with an analytical method which permits on-site analysis and rapid turn around of samples. Both the ORM and NIOSH 7400 methods accomplish this using a special slide preparation device which allows on-site analysis. The Owner's samples are collected in the work area at a rate of up to about 10 liters per minute. The Contractor's samples are collected on workers at a rate up to 2 liters per minute.

The Contractor's air monitoring is required for compliance with OSHA respiratory protection regulations. It involves taking personal samples in the breathing zone of workers at a rate of about 2 liters per minute in strict conformance with the sampling and analytical methodology required by OSHA. Typically these samples will be secured for analysis at an off-site laboratory.

These two sets of samples are related, but certainly not equivalent. Typically personal air samples collected on workers who are actively disturbing ACM will be higher than area samples that are more remote from the disturbance. This difference makes the Owner's air monitoring technically incompatible with the Contractor's

monitoring needs. Even if this were not the case, the owner should not conduct sampling or analysis for the Contractor. At a minimum the Owner would be accepting a new responsibility that is outside of normal construction practice. But the more important point is that the Contractor, not the Owner, is responsible for the health and safety of the workers. If the Owner were to become involved in testing for respiratory protection, then the Contractor's responsibility could be diluted and the Owner could assume some of the Contractor's liability associated with worker safety. **THE OWNER SHOULD NEVER CONDUCT OSHA MONITORING FOR THE CONTRACTOR. THIS AVOIDS THE OWNER BECOMING INVOLVED IN CONTRACTOR'S RESPONSIBILITY FOR WORKER PROTECTION.**

It is recommended that PCM air samples collected during projects be analyzed on-site. Laboratories can easily be set up and quick results from on-site analysis can result in greater safety for the workers because problems are likely to be discovered sooner. There are no accreditation programs for the type of laboratories used on asbestos abatement projects. However, the American Industrial Hygiene Association (AIHA) has a certification program for individual PCM analysts called the "Analyst Registry." Requiring such certification may be a useful quality control measure.

Some state and local jurisdictions (such as New York State) require analysis to be performed at fixed off-site laboratory locations only. This requirement improves the accuracy of the analysis, but at the expense of solving problems at the job site. In such situations the regulatory agency could be petitioned for a variance. If a variance is not granted the safest course of action is to use the accredited lab results for record purposes, and

duplicate the analysis on-site for project management purposes.

Off-site laboratory analysis results are typically available the following day, at best. This means that serious contamination can result before on-

site problems are discovered. On-site labs allow both quick diagnosis of problems and evaluation of the effectiveness of corrective actions. The following example illustrates this point.

An asbestos removal project was designed to split a vacant floor of a high rise building into an asbestos work area and a staging area. The staging area was to serve as the clean room and provide access to elevators and stairs. HEPA filtered fan units were exhausted from the work area into the staging area. A high reading at the output of the fan units, which were continually monitored, resulted in a shut-down of abatement work and a search for the cause of the problem. Air borne fiber levels in the work area remained high and the staging area was becoming progressively more contaminated putting the entire building at increasing risk of contamination. All HEPA filters in the output fans were quickly replaced. In order to save time a very high volume sample (25 liters per minute) was collected. Analysis of this sample showed that the collective output from the fan

units was still contaminated. Next a very high volume sample was collected at the output from each individual unit. The faulty unit was found, shut down, sealed, and replaced (this unit was later found to have a faulty seal at the HEPA filter). The very high volume samples were beyond the acceptable range for PCM's, but provided the information needed to diagnose the problem and avoid a major disaster. The problem was resolved within a few hours.

If the samples were being analyzed off-site the faulty fan unit would not have been discovered until the following day. By this time the workers emerging from the work area would have been exposed and the building would have been contaminated. This problem would have taken days to resolve and could have resulted in the need for a whole building decontamination.

SCHEDULE OF AIR SAMPLES BY OWNER

Air monitoring during abatement work is generally conducted with PCM to provide a rapid turn-around time on samples. This section starts by setting forth a method of establishing a background level. As the project proceeds the background level is compared with daily samples collected in the work area and in adjacent areas. The sampling method to be used by the Owner's air monitor and laboratories is spelled out. This is important as the "Stop Action Levels" given in Part 3 of this section are triggered by the daily air monitoring. Establishing the ground rules for this sampling lets the Contractor know what is expected, and can avoid legal claims later. This needs to be specific enough that the Contractor understands how the sampling is to be conducted, but still allow sufficient flexibility to permit the Owner's air monitor to adapt to changing job conditions.

It is important that this entire section be reviewed

and edited with the assistance of the air monitoring firm and laboratory who will be involved. Any differences between this specification and actual practice in the field could be the basis for dispute.

Ideally the locations for sampling or at least the sampling scheme should be a part of the project design. The exact location of samples may require adjustment to allow for field conditions. For this reason sampling locations should not be shown on drawings that are made a part of the contract documents. However, the sampling scheme should be well explained. This gives the contractor more complete information about how performance is to be evaluated and may help avoid disputes if there is a stop work.

Sample Cassettes: The cassettes indicated in this article are those likely to be found on job site. The PCM filter is the same as used for OSHA sampling, the TEM filter arrangement is

the typical one used for AHERA clearance sampling.

Sampling Volume and Sensitivity:

There are a number of ways of measuring airborne fiber levels, and a number of statistical factors that affect the sample volume required. To avoid the possibility of later disputes, it is important that the specifications spell out the specific method that will be used. . This needs to be done in enough detail that a contractor bidding the project can determine precisely how these measurement are to be made.

Phase Contrast Microscopy (PCM):

There a number of ways of determining an airborne fiber level by PCM. To be practical, sample volumes should be relatively small to avoid overloaded samples, and sample collection times should be relatively short. This argues for high volume (up to 10 liters per minute) sampling rates. The NIBS project committee decided that a simple pass/fail determination that the airborne fiber level measured by a given sample is above or below the specified level is most practical for project monitoring. This is a less stringent measurement than quantifying the level (determining exactly what airborne fiber level is measured by each sample). Quantifying a level requires very large sample volumes (on the order of 3,000 liters or better for a sensitivity of 0.01 f/cc). Samples of this size collected under project conditions are likely to be overloaded and unreadable. Sample collection times would also be too long to be practical for project monitoring. Statistics also plays a part. A greater volume of air is required if inter-laboratory variation is considered along with the variation associated with the measurement.

The pass/fail test is tied to the limit of detection for the analytical method. The sample will pass if the number of fibers counted is at or less than the limit of detection. It will fail if the number of fibers counted is above the limit of detection. In PCM sampling, the limit of detection (LOD) is given in terms of the number of fibers that are on the

Base Line: The base line is the airborne fiber level that exists in the work area before any work

sampling filter. The limit of detection is set by the specific analytical method used. The NIOSH 7400 method sets the limit of detection at 7 fibers/mm² on the filter. This corresponds roughly to 5 fibers counted in 100 fields. The airborne fiber level measured by a sample is determined by the number of fibers counted by the microscopist and the volume of air collected. This means that the 5 fibers at the limit of detection will represent a specific airborne fiber level that is determined by the volume of air sampled. To be useful for project monitoring this airborne fiber level must equal the limit set in the specifications for airborne fiber levels generated by the Contractor's operations. This is accomplished by adjusting the sample volume.

The equation in the specification section used to calculate sample volumes was empirically derived by NIOSH, based on their experience with the 7400 method. This equation allows for the variability of the method and inter-laboratory variability. If inter-laboratory variability were not considered the sample volumes could be lower.

This article should be reviewed with the air monitoring firm and laboratory that will be collecting and analyzing samples. If a different analytical method is used or different limit values, then this section will require editing.

Transmission Electron Microscopy (TEM):

The TEM volume given in the table is the lowest volume allowed by the AHERA clearance method for 10 grid openings to give an analytical sensitivity of 0.005 structures/cc. 10 grid openings on a 200 mesh grid or equivalent area is the number generally preferred by laboratories performing this type of analysis. Adherence to this volume may give rise to greater reproducibility of results.

is performed. Daily samples are compared to the base line to evaluate the Contractor's performance. This article defines the base line and the method

used to determine it. If a situation exists where there is a pre-existing loading of non-asbestos fibers in the area, the section may have to be edited to specify how this will be dealt with. If prior air sampling has established the base line fiber level, revise the article to stipulate this base line rather than specifying a method of arriving at a base line.

The TEM samples collected are held to be analyzed later if questions arise about PCM fiber counts during the work or decontamination of the work area.

Daily: Daily air monitoring of abatement work usually starts when the first activity that could disturb ACM is performed. Typically this will be

the installation of critical and primary barriers. Monitoring then continues daily until project decontamination is complete. Typically these daily samples are collected on the same type of cassette used for personal sampling (25 mm. cassettes with 50-mm long, electrically conductive extension cowls, and 0.8 micrometer mixed cellulose ester filter media).

The table of samples in the specification section will work for most situations. It should be edited as necessary to suit project specifics. Sampling requirements depend on the size and geometry of work area. Number and location of samples should be reviewed with the entity providing air monitoring. If the presence of thin fibers or non-asbestos fiber is suspected, the sampling may have to be augmented by TEM or SEM analysis.

ANALYTICAL METHODS USED BY THE OWNER

This article sets out the "rules" in terms of the analysis that is going to be performed by the owner. Based on this analysis, the owner may stop work for cause or otherwise delay the contractor. This will cost the Contractor money and may result in a claim against the Owner for a change order to recover these costs. For this reason it is necessary to clearly set out the rules to avoid disputes.

Phase Contrast Microscopy: This section sets forth the analytical method that will be used to analyze PCM air samples. The Designer needs to pick one of the two methods given in the Guide Specification section. The firm providing air monitoring should be consulted when making this choice.

Both PCM methods are based on personal sampling methods and call for a sample collection rate of about 2 liter per minute. Samples collected for project monitoring will frequently be collected at up to 10 liters per minute. For this reason the Guide Specification has language advising the Contractor that these sampling collection rates

may be varied from printed standards to allow for high volume sampling. This is generally understood anyway, but spelling it out avoids conflict over a technicality.

The two methods of analyzing air samples by phase contrast microscopy (PCM are the "OSHA Reference Method," (ORM), or the NIOSH 7400 method. The ORM and NIOSH 7400 are an improvement over the old P&CAM 239 method. Both the "ORM" and "NIOSH 7400" methods use vapor of acetone to prepare slides. In the early days this meant having a flask of boiling acetone in a fume hood to prepare slides. To avoid the obvious fire hazard, the use of P&CAM 239, which used liquid chemicals to clear slides, persisted in field use even after it had been superseded in labs. The invention of a special preparation device the "Quick-fix" by R.J. Lee made field use of acetone slide preparation practical and safe. These methods are routinely performed in field laboratories by use of this and similar special slide preparation devices. P&CAM 239 should no longer be used. Compared to P&CAM 239, NIOSH 7400 and the ORM both

have greater sensitivity, better resolution of small fibers, and result in permanent rather than temporary slide mounts.

Transmission Electron Microscopy:

There are two analytical methods in common use on asbestos abatement projects, the Yamate Level II and the AHERA method. The Yamate method is the analytical protocol recommended by the 1985 revision of EPA publication "Guidance for Controlling Asbestos-Containing Materials in Buildings" (purple book). Since the AHERA protocol was developed, clearance sampling is virtually always performed using the analytical protocols set forth in the AHERA regulation (40 CFR Part 763 Appendix A). The AHERA method is required for clearance in schools and is the de facto standard for all clearance sampling. The Yamate Level II reporting format provides more detail. Frequently the electron microscopy lab that will be analyzing the samples should be consulted when selecting the analysis method.

The Yamate method (EPA Provisional Method and Update USEPA 1977, Yamate 1984) was controversial enough among microscopists that it was never formally published by the EPA. Despite this it was universally used by TEM laboratories for analysis of air samples, and was recommended for clearance sampling by the EPA in the Purple Book. One of the problems with the Yamate method is that it was based on the use of polycarbonate sampling filters (Nucleopore). The surface of these filters is very smooth and as such permits the asbestos collected to be directly observed, in the same form and location as was when it landed on the filter. This allowed the observer to see what was actually in the air.

Fibers, bundles of fibers, clumps of fibers (sort of like a dust bunny), and matrices (pieces of material with asbestos fibers sticking out of them) could be identified, as they were in the air. Earlier analysis procedures (indirect preparation) intentionally broke the collected asbestos up into individual fibers. This improved the accuracy of the analysis, but lost any information about the types of particle that were in the air. There were some problems with these very smooth filters. There was some concern that collected asbestos could fall off the filter and stick to cassette walls during transit to the lab. Even worse, for a period of time the filters had a small amount of very small asbestos fibers embedded in the filters during manufacture.

The AHERA protocol improved the filter problem by allowing the use of rougher mixed cellulose ester filter. These filters were rough enough to prevent fibers from falling off in transit, and did not have a contamination problem. The AHERA method also improved on the Yamate rules for identification of particles. It clarified the definition of the different structures counted and eliminated one source of observational error by counting only asbestos structures greater than 0.5 microns in length. Asbestos particles shorter than this are difficult to differentiate and there have been large observational errors for particles below this size. The method also simplified the reporting of results. This reduces analytical costs, and usually has no effect on clearance at the end of the abatement project. However, the detailed information available under the Yamate reporting rules, provides information very useful in solving problems.

LABORATORY TESTING BY OWNER

This article informs the Contractor if the Owner's air monitor will have a laboratory set up at the job

site, or if samples will be sent to a remote lab. This can have a large affect on the cost of the

abatement project. It is customary to have on-site PCM sampling on abatement projects. If this is not going to be done the Contractor will probably want to add cost to allow for time spent waiting

for sample results. This is particularly on projects that involve a number of small work areas where clearance will be by PCM.

FIBERS AND STRUCTURES

This section defines the difference between asbestos and non-asbestos fibers and between a fiber and a structure. The distinction becomes important if there are non-asbestos fibers causing high PCM readings, or if there are fibers discovered by TEM that are too small to be detected by PCM.

Large Fibers: Phase Contrast Microscopy (PCM) detects fibrous airborne particles, but cannot differentiate between asbestos and non-asbestos fibers. This article sets forth the method the Owner will use to resolve situations where non-asbestos airborne fibers are resulting in high PCM readings. TEM analysis is used to differentiate asbestos from non-asbestos fibers. This paragraph includes all asbestos fibers observed by TEM including those that are too thin to be detected by PCM (0.25 microns or less in

diameter).

Small Structures: This paragraph includes asbestos structures too small (thin) to be seen with an optical microscope, in the definition of fibers that can trigger a stop work. These small asbestos structures are included in the clearance requirements of the AHERA regulation. This paragraph uses the length limitation in the AHERA TEM clearance method (fibers under 0.5 microns in length are not counted in an AHERA clearance). The Yamate protocol used for ambient air sampling does not have a lower limitation on fiber length. Revise the paragraph if the Yamate protocol is to be used for project monitoring.

STOP ACTION LEVELS

This article sets "Stop Action Levels." If the airborne fiber levels in the work area are too high the Contractor must stop abatement work and take corrective action. If airborne fiber levels in areas adjacent to the work area exceed a predetermined base level, the contractor must stop abatement work, isolate the area, and decontaminate it. These sections are based on air monitoring conducted by the Owner's air monitor.

Inside Work Area: Two alternative schemes are offered for specifying stop action levels for inside the work area.

- The first alternative requires the contractor to take corrective action if a specific airborne

fiber level is exceeded, for example 0.5 f/cc. Experience has shown that exceeding such a level is an early warning that something is going wrong and needs to be corrected. At a level five times greater, 2.5 f/cc, the Contractor must cease abatement work and take corrective action. The given levels correspond to levels that are generally not exceeded on well run abatement projects working on chrysotile ACM. These levels should be coordinated with the respiratory protection specified. The stop action level should not result in an exposure to workers above the specified permissible exposure level SPEL or the OSHA PEL. The 0.5 f/cc would correspond to an SPEL of 0.01 f/cc for a

worker in a PAPR with a protection factor of 50. The immediate stop action level of 2.5 f/cc results in an exposure of 0.05 f/cc which exceed the SPEL, but is below the OSHA PEL of 0.1 f/cc. The stop action levels should be changed if the level of respiratory protection is changed or a different SPEL is used. The levels will probably require adjustment for amphibole and dry removal projects. This method of specifying stop action levels is particularly appropriate where a specific type of respiratory protection is required by Section 01562 "Respiratory Protection."

This approach is most appropriate when respiratory protection is specified based on a SPEL only and choice of a specific type of respirator is left to the Contractor.

Outside the Work Area: This section

STOP WORK

IT IS STRONGLY RECOMMENDED THAT ADVICE OF COUNSEL BE SOUGHT WHEN EDITING THIS SECTION.

Containment failure or supplied air system problems can create health and safety issues that require immediate correction. On asbestos abatement projects, the designer's on-site project administrator is frequently given the authority to stop work. Many consultants and owners feel that this is the only way that the owner's interest and the health and safety of the occupants of adjacent areas can be protected. However, the responsibilities and associated liabilities for the parties in the construction contract change from normal practice when the project administrator and/or designer are given the authority to stop work. In such situations, the owner, designer, and project administrator may be accepting some of the contractor's responsibility for correctly executing the work.

Consider the situation of a failed containment barrier. If the designer is monitoring the condition

specifies actions that the Contractor must take if air samples taken outside of the work area exceed the base line established before abatement work started. In general the base line should be below the EPA recommended 0.01 f/cc clearance level, and must be below the 0.1 f/cc OSHA PEL. If the base line exceeds these values consideration should be given to a more detailed evaluation of existing conditions than this section anticipates. In some situations TEM sampling may be needed to differentiate between asbestos and non-asbestos fibers. Under proper circumstances it may be possible to use the results of TEM sampling to characterize the fiber population of PCM sampling. A method for accomplishing this is described in the "Fibers and Structures" article in Part 1 of this section. The services of a consultant expert in air monitoring should be sought if this sort of adjustment is required.

of the barriers and has the authority to stop the contractor's abatement work if the barrier fails, this can affect the designer's liability in several ways. If the barrier fails and the contractor's work is stopped and contamination of the building is prevented, then a problem has been avoided. However, if the contractor claims that it was unnecessary to stop work, there may be a claim against the designer for expenses due to a delay of the work. If the work needed to be stopped, but the designer failed to notice this, some of the responsibility for the barrier may be transferred from the contractor to the designer. The designer may end up paying for some or all of the cleanup work necessitated by the barrier failure. If the contractor had sole responsibility for accomplishing the work and monitoring the barriers, then the designer would have significantly less responsibility and subsequent liability in these situations. The situation is more complicated in situations involving worker health and safety. The health and safety of workers is the responsibility of their employer the contractor. However, if the designer is aware of a hazard and

fails to stop the work, some the liability for the worker's health and safety. One thing is clear, the owner and designer are exposed to different risks on asbestos abatement projects than on normal construction projects. Advice of legal counsel should be sought in editing this section.

Owner-Designer Agreement: On a normal construction project the authority to stop work remains with the Owner. The standard agreements for building construction projects need to be modified if the Designer and on-site Projects Administrator are to be given the authority to stop work. The Owner-Designer Agreement must specifically give this authority to the Designer. Usually the Owner will also want to retain this authority rather than delegating it completely away. The exact conditions of this delegation of authority should be set forth in the agreement. The normal role of the Project Administrator is described in AIA Document B352 "Duties, Responsibilities and Limitations of Authority of the Architect's Project Representative." This role is generally that of a passive observer reporting back to the designer. This document should be revised to set forth the specific circumstances under which the Project Administrator has the authority to stop work. There are a number of action levels set forth in the *NIBS Model Guide Specifications* that can be used for this purpose. Usually, the Project Administrator will also be given some discretionary authority to stop work on the general grounds that the work area isolation has become compromised or the health and safety of the building occupants or workers is in jeopardy. The on-site Project Administrator normally works for the Designer, but through the Owner-Designer agreement becomes an agent for

the Owner at the job site. As such, a Project Administrator with the authority to stop work changes the Designer's and Owner's liabilities relative to the project. Allowing the designer and/or project administrator to stop work is a major change in the normal assignment of responsibility and authority on a construction projects. This change should not be made without the advise of legal counsel.

Contract Documents: The Contract Documents that form the agreement between the Owner and Contractor are described in the Introduction. The Owner-Contractor Agreement and General Conditions both leave the authority to stop work with the owner. In these documents stopping of work is envisioned as a last recourse, rather than as an emergency measure. These documents need to be changed to give the authority to stop work to the Designer and Project Administrator. The circumstances upon which work can be stopped should be set forth. These circumstances should match the authority delegated in the Owner-Designer agreement. This modification to the Owner-Contractor Contract Documents makes this delegations of authority binding on the Contractor.

Stop Work Order: A fill in the blanks type Stop Work Order can be developed and given to the Project Administrator. The use of such a form minimizes the potential for miscommunication. The stop work order should halt active asbestos removal work, but should also require the contractor to maintain work area isolation and initiate corrective action.

CONTRACTOR USE OF PREMISES

Always retain this article. The Article summarizes and describes what restrictions the Owner might find necessary to place on the Contractor's use of the premises during the construction period. On asbestos abatement projects, the building is frequently occupied. The Contractor's operations

will need to be restricted so as to minimize conflict with use of the building.

The paragraphs given in the text are situations commonly found on abatement projects. Delete those that do not apply and revise the remaining as

necessary.

OCCUPANCY REQUIREMENTS

The General Conditions establish the Owner's right to occupy a building during construction operations prior to Substantial Completion. This Article specifies the requirements necessary to

implement that right. On asbestos abatement projects, the building is frequently occupied. This Article describes the nature of the Owner's occupancy (full or partial).

SCHEDULE OF ASBESTOS-CONTAINING MATERIALS

If there are no drawings that locate the asbestos-containing materials on the project site, a schedule such as the example given here can be used for purposes of contractor notification. Care should be used in attempting to use such a schedule as a

means of setting forth the scope of work of the project. If this is done the schedule should be made a part of the Owner-Contractor Agreement rather than making it an attachment to a specification section.

SECTION 01013 - SUMMARY OF THE WORK - ASBESTOS ABATEMENT

PART 1 - GENERAL

BASED ON SECTION 01010 "SUMMARY OF WORK" FROM MASTERSPEC® TEXT COPYRIGHTED IN 1993 BY AIA, THE AMERICAN INSTITUTE OF ARCHITECTS.

THIS SECTION HAS BEEN COMPLETELY REVISED FROM THE 2ND EDITION TO REFLECT THE CHANGES OF THE REVISED CORRESPONDING MASTERSPEC SECTION.

THIS SECTION USES THE TERM DESIGNER. CHANGE THIS TERM AS NECESSARY TO MATCH THE ACTUAL TERM USED TO IDENTIFY THE DESIGN PROFESSIONAL AS DEFINED IN THE GENERAL AND SUPPLEMENTARY CONDITIONS.

THIS SECTION, MORE THAN ANY OTHER, IS PROJECT SPECIFIC. SAMPLE TEXT IS CONTAINED IN THE EVALUATIONS TO ILLUSTRATE POSSIBLE SECTION CONTENT. REVISE SAMPLE PARAGRAPHS CAREFULLY TO REFLECT SPECIFIC PROJECT REQUIREMENTS, OR DELETE THEM IF THEY DO NOT APPLY. SEE EVALUATIONS FOR SAMPLE TEXT AND FURTHER DISCUSSION

THIS SECTION IS BASED ON THE PRESUMPTION THAT THE ABATEMENT CONTRACTOR WILL HAVE A CONTRACT DIRECTLY WITH THE OWNER THAT IS INDEPENDENT FROM ALL OTHER CONTRACTORS PERFORMING WORK. IT ALSO ASSUMES THAT THE CONTRACT DOCUMENTS FOR THE ABATEMENT WORK ARE COMPLETELY INDEPENDENT OF DOCUMENTS FOR OTHER PORTIONS OF THE WORK. IF A MORE COMPLICATED RELATIONSHIP EXISTS THEN THIS SECTION SHOULD BE SUBSTANTIALLY REVISED.

1.1 RELATED DOCUMENTS

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

1.2 WORK COVERED BY CONTRACT DOCUMENTS

THIS ARTICLE ILLUSTRATES ONE METHOD OF SUMMARIZING THE WORK. REVISE AS NECESSARY TO DESCRIBE THE PROJECT ACCURATELY.

IN THE FOLLOWING PARAGRAPHS, REMOVE TEXT ENCLOSED IN ANGLE BRACKETS <> AND INSERT TEXT APPROPRIATE FOR THE PROJECT.

PARAGRAPH BELOW IDENTIFIES NAME AND LOCATION OF THE PROJECT AND NAME OF THE OWNER AND THE DESIGNER.

- A. **The Project** consists of <INSERT BRIEF PROJECT DESCRIPTION>

- 1. **Project Location:** <INSERT PROJECT LOCATION (STREET ADDRESS, CITY, AND

STATE).>

2. **Owner:** <INSERT NAME AND ADDRESS OF THE OWNER.>

B. Contract Documents, dated <INSERT DATE INDICATED IN THE CONTRACT DOCUMENTS> were prepared for the Project by <INSERT NAME AND ADDRESS OF THE DESIGNER>.

INSERT PARAGRAPH IDENTIFYING THE CONSTRUCTION MANAGER FOR PROJECTS CONDUCTED USING CONSTRUCTION-MANAGEMENT TECHNIQUES.

INCLUDE AN ABBREVIATED SUMMARY OF WORK FOR THE PROJECT DESCRIBED ABOVE IN PARAGRAPHS BELOW. USE LANGUAGE IDENTICAL TO THAT IN THE AGREEMENT.

C. The Work consists of <INSERT AN ABBREVIATED SUMMARY OF THE PROJECT>

THE FOLLOWING SUBPARAGRAPH IS USUALLY NOT NECESSARY UNLESS THE ABATEMENT INVOLVES INSTALLATION OF UNIQUE SYSTEMS, SUCH AS MAJOR HVAC MODIFICATIONS, INSTALLATION OF TEMPORARY WORK PLATFORMS WITH FINISHED WALLS AND CEILINGS, AND ISOLATION OF COMPUTER SYSTEMS.

1. **The Work** includes <INSERT A BRIEF LISTING OF MAJOR PRODUCTS AND SYSTEMS INCLUDED IN THE PROJECT>

INSERT ADDITIONAL PARAGRAPHS FOR OTHER MAJOR ITEMS OF WORK.

RETAIN THE FOLLOWING IF THE ABATEMENT WORK IS TO BE CARRIED OUT AS A SINGLE PRIME CONTRACT. SEE EVALUATIONS

D. The Work will be constructed under a single prime contract.

1.3 WORK UNDER OTHER CONTRACTS

RETAIN THIS ARTICLE IF WORK UNDER THIS CONTRACT DEPENDS ON SUCCESSFUL COMPLETION OF WORK PERFORMED UNDER OTHER CONTRACTS AND VICE VERSA. SEE EVALUATIONS FOR FURTHER DISCUSSION

RETAIN PARAGRAPH BELOW WHEN WORK UNDER OTHER CONTRACTS IS EXPECTED TO BE COMPLETE BEFORE WORK ON THIS CONTRACT BEGINS. REVISE TO SUIT ACTUAL PROJECT CONDITIONS.

A. Separate Contract: The Owner has awarded a separate contract for performance of certain construction operations at the site. Those operations are scheduled to be substantially complete before work under this Contract begins. The separate contract includes the following:

RETAIN SUBPARAGRAPH BELOW FOR EACH SEPARATE CONTRACT. REMOVE TEXT ENCLOSED IN ANGLE BRACKETS <> AND INSERT TEXT APPROPRIATE FOR THE PROJECT. REPEAT SUBPARAGRAPH BELOW AS NECESSARY TO LIST ALL SEPARATE CONTRACTS.

- 1. **Contract:** A separate contract has been awarded to <INSERT NAME OF SEPARATE CONTRACTOR> for <INSERT A BRIEF DESCRIPTION OF WORK PERFORMED UNDER THE SEPARATE CONTRACT>.

RETAIN PARAGRAPH BELOW WHEN WORK UNDER OTHER CONTRACTS WILL BE CONDUCTED CONCURRENTLY WITH WORK UNDER THIS CONTRACT. REVISE TO SUIT ACTUAL PROJECT CONDITIONS.

- B. **Separate Contract:** The Owner has awarded a separate contract for performance of certain construction operations at the site. Those operations will be conducted simultaneously with work under this Contract. That Contract includes the following:

RETAIN SUBPARAGRAPH BELOW FOR EACH SEPARATE CONTRACT. REMOVE TEXT ENCLOSED IN ANGLE BRACKETS <> AND INSERT TEXT APPROPRIATE FOR THE PROJECT. REPEAT SUBPARAGRAPH BELOW AS NECESSARY TO LIST ALL SEPARATE CONTRACTS.

- 1. **Contract:** A separate contract has been awarded to <INSERT NAME OF SEPARATE CONTRACTOR> to <INSERT A BRIEF DESCRIPTION OF WORK PERFORMED UNDER THE SEPARATE CONTRACT>.

- C. **Cooperate** fully with separate contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

1.4 FUTURE WORK

RETAIN THIS ARTICLE IF WORK UNDER A FUTURE CONTRACT DEPENDS ON SUCCESSFUL COMPLETION OF WORK PERFORMED UNDER THIS CONTRACT. SEE EVALUATIONS FOR FURTHER DISCUSSION

REVISE PARAGRAPH BELOW TO SUIT ACTUAL PROJECT CONDITIONS. .

- A. **Future Contract:** The Owner has awarded a separate contract for additional work to be performed at the site following Substantial Completion. Completion of that work depends on successful completion of preparatory work under this Contract. The Contract for future work includes the following:

RETAIN SUBPARAGRAPH BELOW FOR EACH SEPARATE CONTRACT. REMOVE TEXT ENCLOSED IN ANGLE BRACKETS <> AND INSERT TEXT APPROPRIATE FOR THE PROJECT. REPEAT SUBPARAGRAPH BELOW AS NECESSARY TO LIST ALL SEPARATE CONTRACTS.

1. **Contract:** A separate contract has been awarded to <INSERT NAME OF SEPARATE CONTRACTOR> to <INSERT A BRIEF DESCRIPTION OF WORK PERFORMED UNDER THE SEPARATE CONTRACT>.

1.5 WORK SEQUENCE

RETAIN THIS ARTICLE IF THE PROJECT IS CONDUCTED IN SEPARATE PHASES. DELETE IF PHASED CONSTRUCTION IS NOT REQUIRED. SEE EVALUATIONS FOR DISCUSSION ON PHASED CONSTRUCTION.

AMPLIFY PARAGRAPH BELOW IF NECESSARY. REVISE TO SUIT ACTUAL PROJECT CONDITIONS.

- A. **The Work** will be conducted in <INSERT NUMBER OF PHASES> phases.

RETAIN SUBPARAGRAPH BELOW FOR EACH PHASE REQUIRED. REMOVE TEXT ENCLOSED IN ANGLE BRACKETS <> AND INSERT TEXT APPROPRIATE FOR THAT PHASE. REPEAT SUBPARAGRAPH, REVISED AS APPROPRIATE, FOR EACH SEPARATE PHASE.

1. **Phase <INSERT PHASE NUMBER>:** <BRIEFLY DESCRIBE WORK OF THIS PHASE.> Work of this phase shall be substantially complete, ready for reconstruction within <INSERT TIME> of commencement of construction.

1.6 ASBESTOS-CONTAINING MATERIALS:

OSHA REQUIRES THAT THE OWNER NOTIFY THE CONTRACTOR ABOUT THE LOCATION OF ASBESTOS IN THE BUILDING. INFORMATION ON ASBESTOS TYPE AND CONTENT IS IMPORTANT FOR THE CONTRACTOR TO KNOW. THIS HELPS THE CONTRACTOR ESTIMATE HOW WELL THE MATERIAL WILL WET AND HENCE HOW DUSTY THE WORK IS LIKELY TO BE. THIS AFFECTS THE TYPE OF RESPIRATORY PROTECTION REQUIRED AND MAN-HOURS OF EFFORT NEEDED FOR REMOVAL. REFER TO THE EVALUATIONS FOR ADDITIONAL DISCUSSION.

- A. **The Work** of this contract involves activities that will disturb asbestos-containing materials (ACM) or presumed asbestos-containing materials (PACM). The location and type of ACM known to be present at the worksite is set forth in the drawings. If any other ACM or PACM is found, notify the owner, other employers and employees the about the location and quantity of the ACM or PACM within 24 hours of the discovery.

DELETE EITHER PARAGRAPH ABOVE OR BELOW.

RETAIN PARAGRAPH ABOVE AND DELETE BELOW IF DRAWINGS SHOWING THE LOCATION AND TYPE OF ACM ARE USED TO INDICATE THE SCOPE OF WORK.

DELETE PARAGRAPH ABOVE AND RETAIN BELOW IF THERE ARE NO DRAWINGS AND A SCHEDULE IS USED TO DELINEATE THE SCOPE OF THE WORK. THE SCHEDULE SHOWN AT THE END OF THIS SECTION IS ADEQUATE AS A NOTIFICATION, BUT WOULD NEED TO BE MUCH MORE SPECIFIC TO ADEQUATELY SET FORTH THE SCOPE OF WORK FOR THE PROJECT.

- B. **The Work** of this contract involves activities that will disturb asbestos-containing materials (ACM). The location and type of ACM known to be present at the worksite is set forth in the "Schedule of Asbestos-Containing Materials" at the end of this section. If any other ACM or PACM is found, notify the owner, other employers and employees about the location and quantity of the ACM or PACM within 24 hours of the discovery.

1.7 ASBESTOS HEALTH RISK:

- A. The disturbance or dislocation of ACM may cause asbestos fibers to be released into the building's atmosphere, thereby creating a potential health risk to workers and building occupants. Apprise all workers, supervisory personnel, subcontractors and consultants who will be at the job site of the seriousness of the risk and of proper work procedures which must be followed.
- B. Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified ACM, take appropriate continuous measures as necessary to protect all building occupants from the risk of exposure to airborne asbestos. Such measures shall include the procedures and methods described herein, and compliance with regulations of applicable federal, state and local agencies.

1.8 CONTRACTOR USE OF PREMISES

THIS ARTICLE SPECIFIES REQUIREMENTS THAT GOVERN THE CONTRACTOR'S USE OF THE PREMISES.

RETAIN PARAGRAPH BELOW WHEN THE PROJECT IS ON A VACANT SITE OR IN AN UNOCCUPIED BUILDING BEING RENOVATED. REVISE IF NECESSARY. IF PARAGRAPH IS RETAINED, DELETE THE REMAINDER OF THE ARTICLE UNLESS UNUSUAL PROJECT REQUIREMENTS EXIST.

- A. **General:** During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The Contractor's use of the premises is limited only by the Owner's right to perform work or to retain other contractors on portions of the Project.

DELETE ABOVE AND RETAIN BELOW IF THE SITE WILL BE ACCESSIBLE TO OTHER PARTIES, OR IF SOME PARTS OF A BUILDING BEING RENOVATED WILL BE OCCUPIED DURING CONSTRUCTION. REVISE TO SUIT SPECIFIC PROJECT REQUIREMENTS.

- B. **Use of the Site:** Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.
 - 1. **Owner Occupancy:** Allow for Owner occupancy and use by the public.

SUBPARAGRAPH BELOW CONTAINS AN EXAMPLE OF A SPECIAL REQUIREMENT APPROPRIATE TO MANY PROJECTS. CHANGE THE REQUIREMENT AS NECESSARY TO SUIT PROJECT CONDITIONS OR DELETE IF INAPPROPRIATE.

- 2. **Driveways and Entrances:** Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

INSERT ADDITIONAL PARAGRAPHS AS APPROPRIATE, DESCRIBING ADDITIONAL LIMITATIONS ON USE OF THE SITE BY CONSTRUCTION PERSONNEL.

RETAIN REQUIREMENTS BELOW WHEN THE WORK INVOLVES AN EXISTING OCCUPIED BUILDING. DELETE OTHERWISE.

- C. **Use of the Existing Building:** Maintain the existing building in a weather tight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

INSERT ADDITIONAL PARAGRAPHS SPECIFYING SPECIFIC LIMITATIONS ON A CONTRACTOR'S USE OF AN EXISTING BUILDING. SUBPARAGRAPH BELOW CONTAINS AN EXAMPLE OF A SPECIAL REQUIREMENT APPROPRIATE TO MANY PROJECTS. CHANGE THE REQUIREMENT AS NECESSARY TO SUIT PROJECT CONDITIONS OR DELETE IF INAPPROPRIATE.

COORDINATE THE FOLLOWING PARAGRAPH WITH DIVISION-1 SECTION ON TEMPORARY ENCLOSURES AND DIVISION-14 SECTION ON ELEVATORS. MODIFY THE PARAGRAPH AS APPROPRIATE TO SUIT PROJECT. DELETE IF PROVISIONS ARE INCLUDED ELSEWHERE, OR IF THE PROJECT DOES NOT INVOLVE THE USE OF ELEVATORS. THE FOLLOWING IS WORKABLE FOR SMALL PROJECTS IN BUILDINGS WHERE THE OWNER MAKES INFREQUENT USE OF ELEVATORS. ON HIGH RISE PROJECTS THESE RESTRICTIONS ON THE CONTRACTOR MAY BE UNWORKABLE. USE OF ELEVATORS SHOULD BE CAREFULLY WORKED OUT WITH THE OWNER AND CONTRACTOR. OVER TIGHT RESTRICTIONS ON THE CONTRACTOR'S USE OF ELEVATORS CAN RESULT IN SCHEDULING OR COST PROBLEMS.

- 1. **Use of Existing Elevators:** Except for the Freight Elevator, use of elevators by the Contractor will not be permitted. The Contractor will be permitted to use the freight elevator for temporary freight service and the transportation of construction personnel during the construction period. This elevator must also be available to the Owner at all times; coordinate freight elevator usage with the Designer. Provide protective pads for the elevator car and other appropriate protective measures for the car and entrance doors and frames. During asbestos abatement activities the car is to be protected as set forth in the Division 1 Section on Temporary Enclosures.
- 2. **Smoking:** Smoking or open fires will not be permitted within the building enclosure or on the premises.

COORDINATE THE FOLLOWING PARAGRAPH WITH OTHER DIVISION-1 SECTIONS ON TEMPORARY FACILITIES. MODIFY AS REQUIRED TO SUIT PROJECT.

- 3. **Toilet Rooms:** Except for toilet rooms designated for use by the Contractor's personnel,

use of existing toilets within the building, by the Contractor's personnel, will not be permitted.

1.9 OCCUPANCY REQUIREMENTS

THE ARTICLE BELOW CONTAINS SAMPLE PARAGRAPHS DESCRIBING OCCUPANCY OF THE PROJECT DURING CONSTRUCTION. IT ALSO DESCRIBES PARTIAL OCCUPANCY BEFORE SUBSTANTIAL COMPLETION.

RETAIN PARAGRAPH BELOW WHEN THE OWNER WILL OCCUPY THE PREMISES DURING CONSTRUCTION. MODIFY AS NECESSARY.

- A. Full Owner Occupancy:** The Owner will occupy the site and existing building during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate owner usage. Perform the Work so as not to interfere with the Owner's operations.

RETAIN PARAGRAPH BELOW WHEN THE OWNER MIGHT OCCUPY COMPLETED PORTIONS OF THE BUILDING PRIOR TO SUBSTANTIAL COMPLETION. MODIFY TO SUIT PROJECT REQUIREMENTS.

- B. Partial Owner Occupancy:** The Owner reserves the right to occupy and to place and install equipment in completed areas of the building prior to Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.

SUBPARAGRAPHS BELOW DESCRIBE PROCEDURES AND REQUIREMENTS NECESSARY BEFORE PARTIAL OCCUPANCY OF PORTIONS OF THE PROJECT.

- 1. The Designer will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner occupancy.

1.10 AIR MONITORING BY THE OWNER:

- A. The Owner has contracted for air monitoring.** Air monitoring may be conducted both outside and inside of the work area during the work, and for clearance sampling at the end of the project
 - 1. **Outside of the Work Area:** The Owner's air monitoring firm may sample air outside of the work area to detect faults in the work area isolation such as:
 - a. Contamination of the building outside of the work area with airborne asbestos fibers,
 - b. Failure of filtration or rupture in the differential pressure system,
 - c. Contamination of air outside the building envelop with airborne asbestos fibers.
 - 2. **Inside the Work Area:** The Owner's air monitoring firm may monitor airborne fiber counts in the Work Area. The purpose of this air monitoring is to detect airborne asbestos

concentrations which may challenge the ability of the Work Area isolation procedures to protect the balance of the building or outside of the building from contamination by airborne fibers.

- B. Work area clearance:** Clearance air sampling by the Owner’s air monitor at the completion of asbestos abatement work is described in Section 01711 Project Decontamination.
- C. Air monitoring** required by OSHA is work of the Contractor and is not covered in this section

1.11 SCHEDULE OF AIR SAMPLES BY OWNER:

EDIT THIS SECTION WITH THE ASSISTANCE OF THE FIRM THAT WILL BE PROVIDING AIR MONITORING. REFER TO EVALUATION FOR MORE INFORMATION.

- A. Sample cassettes:** Samples will be collected on 25 mm. cassettes as follows:
 - 1. PCM:** 0.8 micrometer mixed cellulose ester.
 - 2. TEM:** 0.45 micrometer mixed cellulose ester or 0.40 micrometer polycarbonate, with 5.0 micron mixed cellulose ester backing filter.
- B. Number and Volume of Samples:** The number and volume of air samples given in the schedules is approximate. The exact number and volume of samples collected by the Owner may vary depending upon job conditions and the analytical method used.
- C. Sample Volume and Sensitivity:**
 - 1. PCM:** The sample volumes collected by the Owner’s air monitor will be determined by the following formula:

$$Volume = \frac{\left(\frac{Number\ of\ Fibers}{Area\ of\ 100\ fields} \right) \times Total\ Filter\ Area}{\left(\frac{Limit\ Value}{4} \right)}$$

Where:

- Number of fibers = 5 fibers/100 fields, based on a limit of detection (LOD) of 7 fibers/mm² on the filter
- Area of 100 fields = 0.785mm²
- Total Filter Area = 385mm²
- Limit Value = as specified in the schedules of samples below

- a. For purposes of this specification, the sample volume calculated above will be considered to be of sufficient size so that there is a 95% level of confidence that the value measured by each individual sample at the limit of detection (LOD) is less than or equal to the limit values specified below.
 - b. For purposes of this specification, the Limit of Detection (LOD) is defined as 7 fibers/mm² on the filter or 5 fibers/100 fields.
 - c. For purposes of this specification overloaded samples will be considered as exceeding the applicable limit value.
2. **TEM:** Analytical Sensitivity of 0.05 structures/cc as set forth in the AHERA regulation.

D. Base Line:

- 1. **Before Start of Work:** The Owner will secure air samples to establish a base line.
- 2. **PCM Samples**

Location Sampled	Number of Samples	Limit Value (Fibers/cc)	Approx. Volume (Liters)	Rate (Liters/Minute)
Each Work Area	5	0.01	<1,000>	1-10
Outside Each Work Area	5	0.01	<1,000>	1-10
Outside Building	5	0.01	<1,000>	1-10

3. **TEM Samples:**

Location Sampled	Number of Samples	Analytical Sensitivity (Struct./cc.)	Approx. Volume (Liters)	Rate (Liters/Minute)
Each Work Area	1	0.005	1,300	1-10
Outside Each Work Area	1	0.005	1,300	1-10

Outside Building	1	0.005	1,300	1-10
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4. **Base Line:** a level expressed in fibers per cubic centimeter which is twenty-five percent greater than the largest of the following:
 - a. Average of the PCM samples collected outside each Work Area
 - b. Average of the PCM samples collected outside the building
 - c. 0.01 fibers per cubic centimeter
5. **Samples collected for TEM analysis** will be held without analysis. These samples will be analyzed under the conditions and terms set forth in "Fibers Counted" and "Affect On Contract Sum".

E. Daily:

1. **From start of work** of Section 01526 Temporary Enclosures through the work of Section 01711 Project Decontamination, the Owner may take samples.
2. **Sample volume and sensitivity:** inside the work area may vary depending upon conditions in the work area. If samples are overloaded at the sample volume required for a limit value equal to the "Stop Action Levels" or "Immediate Stop Action Levels" given later in this section, the level is considered to have been exceeded.

FOLLOWING IS AN EXAMPLE AND SHOULD BE EDITED TO SUIT PROJECT SPECIFICS. THE LIMIT VALUE AND VOLUME OF SAMPLES INSIDE THE WORK AREA SHOULD TIE IN WITH THE "STOP ACTION LEVELS" SELECTED LATER IN THIS SECTION. SAMPLING REQUIREMENTS DEPEND ON SIZE AND GEOMETRY OF WORK AREA. NUMBER AND LOCATION OF SAMPLES SHOULD BE REVIEWED WITH THE ENTITY PROVIDING AIR MONITORING. IF THIN FIBERS ARE SUSPECTED OR NON-ASBESTOS FIBER ARE SUSPECTED THE FOLLOWING MAY HAVE TO BE AUGMENTED BY TEM OR SEM ANALYSIS.

3. PCM Samples:

Location Sampled	Number of Samples	Limit Value (Fibers/cc)	Approx. Volume (Liters)	Rate (LPM)
Each Work Area	2	<0.1>	<100>	1-10
Outside Each Work Area at Critical Barrier	1	0.01	<1,000>	1-10

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Clean Room	1	0.01	<1,000>	1-10
Equipment Decon	1	0.01	<1,000>	1-10
Outside Building	1	0.01	<1,000>	1-10
Output of Pressure Differential System	1	0.01	<1,000>	1-10

F. **Additional samples** may be taken at Owner's or Designer's discretion. If airborne fiber counts exceed allowed limits additional samples may be taken as necessary to monitor fiber levels.

1.12 ANALYTICAL METHODS USED BY THE OWNER:

THIS ARTICLE SETS OUT THE "RULES" IN TERMS OF THE ANALYSIS THAT IS GOING TO BE PERFORMED BY THE OWNER. BASED ON THIS ANALYSIS, THE OWNER MAY, FOR CAUSE, STOP WORK OR OTHERWISE DELAY THE CONTRACTOR. IT IS NECESSARY TO CLEARLY SET OUT THE RULES TO AVOID DISPUTES.

A. The following methods will be used by The Owner in analyzing filters used to collect air samples. Sampling rates may be varied from printed standards to allow for high volume sampling.

CHOOSE ONE OF THE FOLLOWING PCM METHODOLOGIES AND DELETE THE OTHER ONE. SOME STATE AND LOCAL JURISDICTIONS REQUIRE ANALYSIS TO BE PERFORMED AT FIXED LABORATORY LOCATIONS ONLY. EDIT THE FOLLOWING ACCORDINGLY

1. Phase Contrast Microscopy (PCM) will be performed using the NIOSH 7400 method.
2. Phase Contrast Microscopy (PCM) will be performed using the OSHA Reference Method (ORM).

CHOOSE ONE OF THE FOLLOWING TEM METHODOLOGIES AND DELETE THE OTHER.

3. Transmission Electron Microscopy(TEM) will be performed using the analysis method set forth in the AHERA regulation 40 CFR Part 763 Appendix A.
4. Transmission Electron Microscopy (TEM) will be performed using the Level II analysis per EPA Provisional Method and Update (USEPA 1977, Yamate 1984), with either polycarbonate or mixed cellulose ester filters.

1.13 LABORATORY TESTING BY OWNER:

CHOOSE THE APPROPRIATE PARAGRAPH FROM THE THREE BELOW AND DELETE THE OTHER TWO. IT IS IMPORTANT TO THE CONTRACTOR TO KNOW HOW IMMEDIATELY AIR SAMPLE RESULTS WILL BE AVAILABLE.

THE FOLLOWING PARAGRAPH REPRESENTS THE IDEAL SITUATION FOR BOTH THE CONTRACTOR AND THE OWNER. IF THERE IS A PROBLEM WITH MAINTAINING LOW FIBER COUNTS THE ABILITY TO READ AN AIR SAMPLE IMMEDIATELY WILL BE AN IMPORTANT DIAGNOSTIC TOOL.

- A. The services of a testing laboratory** may be employed by the Owner to perform laboratory analyses of the air samples. A microscope and technician will be setup at the job site, so that verbal reports on air samples can be obtained immediately.

THE FOLLOWING PARAGRAPH SHOULD BE USED IF THERE WILL BE NO MICROSCOPE AT THE JOB SITE.

EDIT THE FOLLOWING TO INDICATE HOW SAMPLES WILL BE TRANSMITTED AND HANDLED.

- B. The services of a testing laboratory** may be employed by the Owner to perform laboratory analyses of the air samples. A technician will be at the job site, and samples will be sent daily by carrier for next day delivery, so that verbal reports on air samples can be obtained within 24 hours.

THE FOLLOWING PARAGRAPH IS A CATCH-ALL AND DOES NOT PROVIDE THE CONTRACTOR WITH DETAILED INFORMATION ON HOW THE OWNER INTENDS TO ANALYZE AIR SAMPLES.

- C. The services of a testing laboratory** may be employed by the Owner to perform laboratory analyses of the air samples. A microscope and technician will be set up at the job site, or samples will be sent overnight on a daily basis, so that verbal reports on air samples can be obtained within 24 hours. The Contractor will have access to all air monitoring tests and results.

CHOOSE ONE OF THE TWO PARAGRAPHS BELOW AND DELETE THE OTHER.

THE FOLLOWING PARAGRAPH ASSURES A HIGH LEVEL OF COMMUNICATION BETWEEN THE CONTRACTOR AND THE OWNER'S AIR MONITORING FIRM. THIS FREE FLOW OF INFORMATION INSURES THAT THE CONTRACTOR WILL HAVE THE INFORMATION HE NEEDS TO DETERMINE THE SUCCESS OF CONTROL MEASURES BEING IMPLEMENTED. HOWEVER, THIS DOES BIND THE OWNER TO PROVIDING THIS INFORMATION.

- D. A complete record** of all air monitoring and results will be furnished to the Designer, the Owner, and the Contractor.

THE FOLLOWING LANGUAGE PROTECTS THE OWNER FROM ABROGATION OF CONTRACT IF FOR SOME REASON HE FAILS TO PROVIDE TEST DATA.

- E. **The Contractor will have access** to all air monitoring tests and results upon request.

FOLLOWING IS AN EXAMPLE. REVISE AFTER CONSULTATION WITH THE FIRM WHO WILL BE PROVIDING AIR MONITORING. POSTING OF RESULTS IS IDEAL FROM THE BOTH THE OWNER'S AND CONTRACTOR'S POINT OF VIEW. HOWEVER, THIS DOES BIND THE OWNER TO PROVIDE THIS INFORMATION.

- F. **Written Reports:** of all air monitoring tests will be posted at the job site on a daily basis.

1.14 FIBERS AND STRUCTURES

THE FOLLOWING ESTABLISHES THE GROUND RULES WHICH WILL BE USED TO DETERMINE WHICH ANALYTICAL METHODS WILL BE USED AND WHAT DEFINITION OF "FIBER" WILL BE USED IN ENFORCING THE SPECIFICATION. THE FOLLOWING MAKES THE PCM MICROSCOPE, WHICH MAY BE AT THE JOB SITE, THE FIRST METHOD TO BE USED TO DETERMINE AIRBORNE FIBER COUNTS. IF THERE IS A CONSISTENT PROBLEM WITH HIGH FIBER COUNTS OR IF EXTREMELY SMALL FIBERS ARE ANTICIPATED THEN ELECTRON MICROSCOPY (PREFERABLY TEM) IS USED TO DETERMINE AIRBORNE FIBER COUNTS. THE FOLLOWING SHOULD BE REVIEWED WITH THE CONSULTANT PROVIDING ON-SITE AIR MONITORING FOR THE OWNER AND REVISED AS APPROPRIATE.

- A. **Fibers Counted:** The following procedure will be used to resolve any disputes regarding fiber types when a project has been stopped due to excessive airborne fiber counts.

THE FOLLOWING LANGUAGE SETS OUT THE METHOD OF RESOLVING SITUATIONS WHERE THERE ARE NON-ASBESTOS FIBERS IN THE AIR CAUSING HIGH PCM FIBER COUNTS. IN SITUATIONS WHERE THIS IS EXPECTED TO BE A PROBLEM, THE BACKGROUND SAMPLING SHOULD INCLUDE ELECTRON MICROSCOPY. THE INFORMATION ON THIS ANALYSIS SHOULD BE INCLUDED IN THE CONTRACT DOCUMENTS.

1. **Large Fibers:** "Airborne Fibers" referred to above include all fibers regardless of composition as counted by phase contrast microscopy (PCM), unless additional analysis by transmission or scanning electron microscopy demonstrates to the satisfaction of the Designer that non-asbestos fibers are being counted. "Airborne Fibers" counted in samples analyzed by transmission electron microscopy shall be asbestos fibers, greater than 5 microns in length. For purposes of stop action levels, subsequent to analysis by electron microscopy, the number of "Airborne Fibers" shall be determined by multiplying the number of fibers, regardless of composition, counted by PCM by the proportion of fibers that are asbestos as determined by TEM (a number equal to, asbestos fibers counted, divided by all fibers counted in the electron microscopy analysis).

THE FOLLOWING INCLUDES ASBESTOS STRUCTURES TOO SMALL TO BE SEEN WITH AN OPTICAL MICROSCOPE, IN THE DEFINITION OF FIBERS THAT CAN TRIGGER A STOP WORK. SEE EVALUATION

2. **Small Structures:** "Airborne Fibers" referred to above include asbestos structures (fibers, bundles, clusters or matrices) of any diameter and any length greater than 0.5 microns.

1.15 ADDITIONAL TESTING:

IT IS NOT GOOD PRACTICE TO HAVE THE CONTRACTOR PROVIDE ANY OF THE TESTING DESCRIBED IN THIS SPECIFICATION SECTION. THESE ANALYSES ARE USED TO DETERMINE PERFORMANCE. THE FOLLOWING ADDRESSES THE TOPIC OF TESTING WHICH THE CONTRACTOR MAY WISH TO PERFORM. GENERALLY THIS WILL BE AIR SAMPLING PERFORMED FOR OSHA COMPLIANCE.

IT IS GOOD PRACTICE TO REQUIRE THE CONTRACTOR TO ENGAGE THE SERVICES OF AN INDEPENDENT LABORATORY RATHER THAN USING THE ENTITY PROVIDING SERVICES FOR THE OWNER.

- A. **The Contractor may conduct** air monitoring and laboratory testing. If he elects to do this the cost of such air monitoring and laboratory testing shall be at no additional cost to the Owner.

1.16 PERSONAL MONITORING:

- A. **Owner will not perform** air monitoring for the Contractor to meet Contractor's OSHA requirements for personal sampling or any other purpose.

1.17 MISCELLANEOUS PROVISIONS

RETAIN THIS ARTICLE ONLY WHEN THE PROJECT IS SUBJECT TO UNUSUAL GENERAL REQUIREMENTS THAT DO NOT BELONG ELSEWHERE BUT AFFECT THE ENTIRE PROJECT. DELETE THE ENTIRE ARTICLE IF NO UNUSUAL REQUIREMENTS ARE REQUIRED.

INSERT PARAGRAPHS HERE AS APPROPRIATE, DETAILING FULLY MISCELLANEOUS PROVISIONS. DEVELOP PARAGRAPHS TO SATISFY SPECIFIC PROJECT REQUIREMENTS.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 STOP ACTION LEVELS:

CHOOSE ONE OF THE TWO ARTICLES ON "INSIDE WORK AREA" BELOW AND DELETE THE OTHER. THE FIRST IS BASED ON A SINGLE STOP ACTION LEVEL. THE SECOND IS BASED ON THE RESPIRATORY PROTECTION BEING PROVIDED. BACKGROUND LEVELS SHOULD BE CONSIDERED IN SETTING STOP ACTION LEVELS. IN SOME INDUSTRIAL SETTINGS THE FOLLOWING COULD BE REQUIRING A CLEANER ENVIRONMENT THAN IS GENERALLY AVAILABLE OUTSIDE THE WORK AREA.

BELOW IS AN EXAMPLE. EDIT TO SUIT SPECIFIC PROJECT REQUIREMENTS. A SIMPLE STOP ACTION LEVEL OF 0.5 F/CC IS NOT REQUIRED BY ANY STANDARD OR CODE, BUT IS PRACTICAL TO MAINTAIN DURING THE COURSE OF A NORMAL REMOVAL, OR ENCAPSULATION, OR ENCLOSURE PROJECT. IF THIS LEVEL IS EXCEEDED IT MAY INDICATE THAT SOMETHING IS GOING WRONG. 0.5 IS A PRACTICAL LIMIT FOR A CHRYSOTILE REMOVAL PROJECT. THIS MAY NEED TO BE HIGHER FOR AN AMOSITE OR CROCIDOLITE PROJECT.

COORDINATE THIS SECTION WITH THE PEL AND RESPIRATOR PROTECTION FACTORS SPECIFIED IN SECTION 01562 RESPIRATORY PROTECTION. THE RESPIRATORY PROTECTION REQUIRED SHOULD PREVENT AN EXPOSURE GREATER THAN THE SPECIFIED PEL AT THE AIRBORNE LIMITS SET BELOW. FOR A TWA OF 0.01 F/CC A RESPIRATOR WITH A MINIMUM PROTECTION FACTOR OF 50 IS REQUIRED AT THE 0.5 F/CC SET FORTH BELOW. IF THE LIMIT BELOW WERE RAISED TO 1.0 F/CC (SUCH AS IT MIGHT FOR AN AMOSITE JOB), THEN RESPIRATORY PROTECTION WITH A PROTECTION FACTOR OF 100 WOULD NEED TO BE SPECIFIED IN 01562 TO MAINTAIN THE SAME PEL.

- A. **Inside Work Area:** Maintain an average airborne count in the Work Area of less than 0.5 fibers per cubic centimeter. If the fiber counts rise above this figure for any sample taken, revise work procedures to lower fiber counts. If the Time Weighted Average (TWA) fiber count for any work shift or 8 hour period exceeds 0.5 fibers per cubic centimeter, stop all work, leave Pressure Differential System in operation and notify Designer. After correcting cause of high fiber levels, do not recommence work for 24 hours unless otherwise authorized, in writing, by Designer.
 - 1. If airborne fiber counts exceed 2.5 fibers per cubic centimeter for any period of time cease all work except corrective action until fiber counts fall below 0.5 fibers per cubic centimeter and notify Designer. After correcting cause of high fiber levels, do not recommence work for 24 hours unless otherwise authorized, in writing, by Designer.

MAINTAINING THESE WORK PLACE FIBER COUNTS FOR AMOSITE REMOVALS MAY REQUIRE STRINGENT WORK PRACTICE CONTROL AND ADDITIONAL HEPA FILTERED PRESSURE DIFFERENTIAL AND VENTILATION SYSTEMS RE-CYCLED IN THE SPACE.

IF THE RESPIRATORY PROTECTION IS BASED ON A PARTICULAR TYPE OF RESPIRATOR RATHER THAN A STIPULATED PERMISSIBLE EXPOSURE LIMIT (PEL) THE STOP ACTION LEVELS BELOW SHOULD BE RELATED TO THE RESPIRATORY PROTECTION. THE STOP ACTION LEVELS GIVEN BELOW ARE BASED ON A TWA OF 0.01 F/CC AND AN IMMEDIATE STOP LEVEL 5 TIMES THIS AMOUNT.

- B. **Inside Work Area:** Maintain an average airborne count in the work area of less than the Stop Action Level given below for the type of respiratory protection in use. If the fiber counts rise above this figure for any sample taken, revise work procedures to lower fiber counts. If the Time Weighted Average (TWA) fiber count for any work shift or 8 hour period exceeds the Stop Action Level, stop all work except corrective action, leave pressure differential and air circulation system in operation and notify Designer. After correcting cause of high fiber levels, do not recommence work for 24 hours unless otherwise authorized, in writing, by Designer.

STOP ACTION LEVEL (f/cc)	IMMEDIATELY STOP LEVEL (f/cc)	MINIMUM RESPIRATOR REQUIRED	PROTECTION FACTOR
0.1	0.5	Half face	10
0.5	2.5	PAPR	50
1.0	5.0	Supplied Air Pressure Demand	100

1. If airborne fiber counts exceed Immediate Stop Level given above for type of respiratory protection in use for any period of time cease all work except corrective action. Notify Designer. Do not recommence work until fiber counts fall below Stop Action Level given above for the type of respiratory protection in use. After correcting cause of high fiber levels, do not recommence work for 24 hours unless otherwise authorized, in writing, by Designer.

MAINTAINING THESE WORK PLACE FIBER COUNTS FOR AMOSITE REMOVALS MAY REQUIRE STRINGENT WORK PRACTICE CONTROL AND ADDITIONAL PRESSURE DIFFERENTIAL AND HEPA FILTERED VENTILATION SYSTEMS RECYCLED IN THE SPACE.

EDIT THE FOLLOWING FOR PROJECT SPECIFICS. IN GENERAL, A PCM LIMIT SHOULD BE AT OR BELOW THE 0.01 F/CC AHERA CLEARANCE CRITERIA. AT AN ABSOLUTE MINIMUM REQUIREMENT, THE LEVEL REQUIRING REMEDIAL ACTION MUST BE LOWER THAN THE 0.1 FIBERS PER CUBIC CENTIMETER OSHA PEL. IF THIS LEVEL IS EXCEEDED IT MAY BE NECESSARY TO INITIATE OSHA COMPLIANCE ACTIVITIES FOR BUILDING OCCUPANTS.

C. Outside Work Area: If any air sample taken outside of the Work Area exceeds the base line established in Part 1 of this section, immediately and automatically stop all work except corrective action. The Designer will determine the source of the high reading and so notify the Contractor in writing.

1. If the high reading was the result of a failure of Work Area isolation measures initiate the following actions:
 - a. Immediately erect new critical barriers as set forth in Section 01526 Temporary Enclosures to isolate the affected area from the balance of the building. Erect Critical Barriers at the next existing structural isolation of the involved space (e.g. wall, ceiling, floor).
 - b. Decontaminate the affected area in accordance with Section 01712 Cleaning & Decontamination Procedures.
 - c. Require that respiratory protection as set forth in Section 01562 Respiratory Protection be worn in affected area until area is cleared for re-occupancy in accordance with Section 01711 Project Decontamination.
 - d. Leave Critical Barriers in place until completion of work and insure that the operation of the pressure differential system in the Work Area results in a flow of air from the balance of the building into the affected area.
 - e. If the exit from the clean room of the personnel decontamination unit enters the

affected area, establish a decontamination facility consisting of a Shower Room and Changing Room as set forth in Section 01563 Decontamination Units at entry point to affected area.

- f. After Certification of Visual Inspection in the Work Area remove critical barriers separating the work area from the affected area. Final air samples will be taken within the entire area as set forth in Section 01711 Project Decontamination.
- 2. If the high reading was the result of other causes initiate corrective action as determined by the Designer.

FOLLOWING RESTATES IN MORE SPECIFIC FORM PROVISIONS OF THE GENERAL CONDITIONS.

- D. **Effect on Contract Sum:** Complete corrective work with no change in the Contract Sum if high airborne fiber counts were caused by Contractor's activities. The Contract Sum and schedule will be adjusted for additional work caused by high airborne fiber counts beyond the Contractor's control.

3.2 STOP WORK:

THIS SECTION CHANGES SOME OF THE NORMAL RELATIONSHIPS IN THE CONTRACTS FOR CONSTRUCTION. IT IS STRONGLY RECOMMENDED THAT ADVICE OF COUNSEL BE SOUGHT WHEN EDITING THIS SECTION.

PROBLEMS SUCH AS A CONTAINMENT FAILURE OR SUPPLIED AIR SYSTEM PROBLEMS CAN CREATE HEALTH AND SAFETY ISSUES THAT REQUIRE IMMEDIATE CORRECTION. ON ASBESTOS ABATEMENT PROJECTS, THE ON-SITE PROJECT ADMINISTRATOR IS FREQUENTLY GIVEN THE AUTHORITY TO STOP WORK. HOWEVER, THE RESPONSIBILITIES AND ASSOCIATED LIABILITIES FOR THE PARTIES IN THE CONSTRUCTION CONTRACT CHANGE FROM NORMAL PRACTICE WHEN THE PROJECT ADMINISTRATOR AND DESIGNER ARE GIVEN THE AUTHORITY TO STOP WORK. REFER TO THE EVALUATIONS FOR MORE DISCUSSION ON THIS MATTER.

IF THE FOLLOWING PARAGRAPH IS USED THE AGREEMENT BETWEEN THE OWNER AND PROJECT ADMINISTRATOR NEEDS TO BE CHANGED FROM NORMAL PRACTICE AND GIVE THE PROJECT ADMINISTRATOR THE AUTHORITY TO STOP WORK FOR THE OWNER. THE AIA AND EJCDC STANDARD GENERAL CONDITIONS WILL ALSO NEED TO BE ALTERED.

- A. **If the Owner or the Project Administrator** presents a written stop work order, immediately and automatically conform to that stop work order, while maintaining temporary enclosures and pressure differential. Do not recommence abatement work until authorized in writing by Owner or Project Administrator.

DELETE EITHER PARAGRAPH ABOVE OR BELOW. RETAIN THE PARAGRAPH ABOVE AND DELETE THE PARAGRAPH BELOW IF THE AUTHORITY TO STOP WORK IS TO BE RETAINED BY THE OWNER, DELETE ABOVE AND RETAIN BELOW IF THE DESIGNER HAS AGREED TO ACCEPT RESPONSIBILITY FOR STOPPING WORK.

- B. **If the Owner, Designer, or Project Administrator** presents a written stop work order, immediately and automatically conform to that stop work order, while maintaining temporary enclosures and pressure differential. Do not recommence abatement work until authorized in

writing by Owner, Designer or Project Administrator.

IN GENERAL ALWAYS RETAIN THE FOLLOWING. REVISE AS NECESSARY FOR PROJECT SPECIFICS.

- C. Immediately initiate the following actions:** After being presented with a stop work order immediately:
1. Cease all asbestos removal activities, or any other activities that disturbs ACM.
 2. Repair any fallen, ripped or otherwise failed work area isolation measures.
 3. Maintain in operation all work area isolation measures including those required by Sections 01526 “Temporary Enclosures,” 01513 “Temporary Pressure Differential & Air Circulation System,” 01563 “Decontamination Units.”
 4. Maintain all worker protections including those required by Sections 01560 “Worker Protection - Asbestos Abatement,” and 01562 “Respiratory Protection.”
 5. Fog the air in the work area with a mist of amended water to reduce airborne fiber levels.
- D. Do not recommence work** until authorized in writing by the Owner or Designer.

SCHEDULE OF ASBESTOS-CONTAINING MATERIALS:

IF A SCHEDULE OF ASBESTOS-CONTAINING MATERIALS (ACM) IS USED INSTEAD OF DRAWINGS TO SHOW THE LOCATION AND TYPE OF ACM, THE SCHEDULE MUST BE COMPLETE AND ACCURATE SINCE OMISSION OF ANY ITEM, LOCATION OF ANY ITEM OR ERROR IN QUANTITY GIVES THE CONTRACTOR GROUNDS FOR A CLAIM FOR AN EXTRA.

IF A SCHEDULE OF ASBESTOS-CONTAINING MATERIALS (ACM) IS REQUIRED, INSERT A LISTING OF ALL ACM EXPECTED TO BE ENCOUNTERED AT EACH WORK LOCATION. NOTIFICATION OF THE LOCATION, AND QUANTITY OF ACM IS REQUIRED BY OSHA. INCLUDE THE TYPE AND PERCENT OF ASBESTOS-CONTENT FOR EACH SPECIFIC BUILDING MATERIAL TO BE ABATED. THE "OTHER" COMPONENTS" MAY BECOME IMPORTANT IN BUILDING CLEARANCE. THIS INFORMATION CAN HELP A LABORATORY IN ITS ANALYSIS OF AIR SAMPLES.

THE FOLLOWING IS AN EXAMPLE OF THE PRESENTATION OF INFORMATION NEEDED. REVISE AS REQUIRED TO SUIT PROJECT.

Quantities are estimations only and need to be field verified by Contractor.

Item/Location	Estimated Quantity	Asbestos Content	Other Components
BOILER INSULATION			
<i>Boiler:</i>			
<i>Surface Coat</i>	<i>100SqFt</i>	<i>95% to 100% Chrysotile</i>	<i>Rock Wool</i>
<i>Base Coat</i>	<i>100SqFt</i>	<i>60% to 65% Amosite</i>	<i>Refractory Binders</i>
<i>Boiler Breeching:</i>			
<i>Surface Coat</i>	<i>100SqFt</i>	<i>75% to 80% Chrysotile</i>	<i>Gypsum plaster</i>
<i>Base Coat</i>	<i>100SqFt</i>	<i>45% to 50% Amosite</i>	<i>Refractory Binders</i>
PIPE INSULATION:			
<i>Air Cell on domestic cold water piping</i>	<i>115 Ft</i>	<i>45% to 50% Chrysotile</i>	<i>Cellulose</i>
<i>Plaster Fittings, on cold water piping Bodies, etc.</i>	<i>35Units</i>	<i>30% to 35% Chrysotile</i>	<i>Rockwool, Gypsum, Plaster</i>
ARCHITECTURAL SURFACES			
<i>Troweled-on acoustical plaster in Library</i>	<i>1750SqFt</i>	<i>9% to 10% Chrysotile</i>	<i>Sand, Gypsum, Plaster</i>

FIREPROOFING

*Sprayed-on
fireproofing,
on beams in rooms
16, 35 and 36*

1450 SqFt

25% to 30% Chrysotile

*Vermiculite,
Gypsum*

END OF SECTION - 01013

SECTION 01028 - APPLICATIONS FOR PAYMENT - ASBESTOS ABATEMENT

THIS SECTION IS BASED ON SECTION 01027 - "APPLICATIONS FOR PAYMENT" FROM MASTERSPEC® TEXT COPYRIGHTED IN 1993 BY AIA, THE AMERICAN INSTITUTE OF ARCHITECTS.

THIS SECTION USES THE TERM DESIGNER. CHANGE THIS TERM AS NECESSARY TO MATCH THE ACTUAL TERM USED TO IDENTIFY THE DESIGN PROFESSIONAL AS DEFINED IN THE GENERAL AND SUPPLEMENTARY CONDITIONS.

THIS SECTION IS BASED ON THE PRESUMPTION THAT THE ABATEMENT CONTRACTOR WILL HAVE A CONTRACT DIRECTLY WITH THE OWNER THAT IS INDEPENDENT FROM ALL OTHER CONTRACTORS PERFORMING WORK. IT ALSO ASSUMES THAT THE CONTRACT DOCUMENTS FOR THE ABATEMENT WORK ARE COMPLETELY INDEPENDENT OF DOCUMENTS FOR OTHER PORTIONS OF THE WORK. IF A MORE COMPLICATED RELATIONSHIP EXISTS THEN THIS SECTION SHOULD BE SUBSTANTIALLY REVISED.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

THE FOLLOWING IS CORRECT FOR A SINGLE PRIME CONTRACT WITH THE OWNER FOR ASBESTOS ABATEMENT WORK. IF THE ASBESTOS ABATEMENT CONTRACTOR IS A PRIME CONTRACTOR ON A PROJECT WITH OTHER PRIME CONTRACTORS, OR IS A SUBCONTRACTOR, THEN THE FOLLOWING WILL HAVE TO BE REVISED.

- A. **This Section specifies** administrative and procedural requirements governing the Contractor's Applications for Payment.
 - 1. Coordinate the Schedule of Values and Application for Payment with the Contractor's Construction Schedule, Submittal Schedule, and List of Subcontracts.
- B. **Related Sections** - The following Sections contain requirements that relate to this Section.

REVISE SUBPARAGRAPHS BELOW IF ASBESTOS ABATEMENT IS PART OF A LARGER PROJECT WITH MORE DETAILED SUBMITTAL REQUIREMENTS AND THE GUIDE SPEC SECTIONS ON COORDINATION AND SUBMITTALS HAVE BEEN REPLACED WITH MORE COMPREHENSIVE SECTIONS ."

- 1. **Contractor's Construction Schedule:** The Contractor's Construction Schedule is specified in Division 1 Section "Coordination - Asbestos Abatement."
- 2. **Submittal Schedule:** The Submittal Schedule is specified in Division 1 Section "Submittals."

1.3 SCHEDULE OF VALUES

SMALL PROJECTS OF SHORT DURATION MAY NOT NEED A SCHEDULE OF VALUES, EVEN THOUGH GENERAL CONDITIONS REQUIRE ONE. IF THIS IS THE CASE, MODIFY GENERAL CONDITIONS ACCORDINGLY, DELETE THIS ARTICLE AND REFERENCE THE SCHEDULE OF VALUES ELSEWHERE IN SPECIFICATIONS.

THE FOLLOWING IS CORRECT FOR A SINGLE PRIME CONTRACT WITH THE OWNER. IF THE ASBESTOS ABATEMENT CONTRACTOR IS A PRIME CONTRACTOR ON A PROJECT WITH OTHER PRIME CONTRACTORS, OR IS A SUBCONTRACTOR, THEN THE FOLLOWING WILL HAVE TO BE REVISED.

- A. **Coordination:** Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:

MODIFY THE LIST BELOW TO SUIT PROJECT REQUIREMENTS BY ADDING OR DELETING ITEMS.

- a. Contractor's Construction Schedule.
- b. Application for Payment forms, including Continuation Sheets.
- c. List of subcontractors.
- d. Schedule of allowances.
- e. Schedule of alternates.
- f. List of products.
- g. List of principal suppliers and fabricators.
- h. Schedule of submittals.

REVISE THE 7-DAY TIME PERIOD IN PARAGRAPH BELOW IF NECESSARY TO SUIT PROJECT REQUIREMENTS.

- 2. **Submit the Schedule of Values** to the Designer at the earliest possible date but no later than 7 days before the date scheduled for submittal of the initial Applications for Payment.

DELETE THE REQUIREMENT BELOW IF PHASING IS NOT REQUIRED.. FOR LARGE PROJECTS, CONSIDER REVISING THE REQUIREMENT TO PROVIDE SUBSCHEDULES FOR SEPARATE FLOORS OR LARGE INDIVIDUAL AREAS.

- 3. **Subschedules:** Where Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

DELETE THE FOLLOWING UNLESS A SPECIFIC FORM IS TO BE USED FOR THE SCHEDULE OF VALUES. REQUIRING THAT A SPECIFIC FORM BE USED COULD CONFLICT WITH THE CONTRACTOR'S NORMAL METHOD OF OPERATION. THIS COULD UNNECESSARILY COMPLICATE THE PAYMENT PROCESS. A SAMPLE FORM IS INCLUDED AT THE END OF THIS SECTION.

- B. **Form:** Submit Schedule of Values on the form at the end of this section.

RETAIN THE REQUIREMENTS BELOW. REVISE TO SUIT PROJECT REQUIREMENTS.

- C. **Format and Content:** Submit a Schedule of Values that is based on functional, measurable, observable portions of the Work. Where appropriate breakdown the Work into phases, building areas or floors.

- 1. **Identification:** Include the following Project identification on the Schedule of Values:

MODIFY THE LIST BELOW TO SUIT PROJECT REQUIREMENTS BY ADDING OR DELETING ITEMS.

- a. Project name and location.
- b. Name of the Designer.
- c. Project number.
- d. Contractor's name and address.
- e. Date of submittal.

- 2. **Breakdown Contract Sum** into each of the following items:

MODIFY THE LIST BELOW TO SUIT PROJECT REQUIREMENTS BY ADDING OR DELETING ITEMS. IF PROJECT IS IN PHASES, THE CONTRACT SUM SHOULD BE BROKEN DOWN BY PHASE

- a. Mobilization
- b. Preparation of Work Area
- c. Site Demolition
- d. Asbestos Abatement
- e. Project Decontamination
- f. Other Work
- g. Project Closeout

- 3. **Arrange the Schedule of Values** in tabular form with separate columns to indicate the following for each item listed:

MODIFY THE LIST BELOW TO SUIT PROJECT REQUIREMENTS BY ADDING OR DELETING ITEMS.

- a. Related Specification Sections or Divisions
- b. Description of Work.
- c. Name of subcontractor.
- d. Name of manufacturer or fabricator.
- e. Name of supplier.
- f. Change Orders (numbers) that affect value.
- g. Dollar value.
 - 1) Percentage of Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

- 4. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Where appropriate, break principal subcontract amounts down into several line items.
- 5. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.

DELETE THE FOLLOWING IF THE PROJECT CONSISTS ONLY OF DEMOLITION AND REMOVAL WORK AND DOES NOT INCLUDE INSTALLATION OF NEW MATERIALS OR ASSEMBLIES.

- 6. Provide a separate line item in the Schedule of Values for each part of the Work involving installation of new materials, assemblies or systems where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include requirements for insurance and bonded warehousing, if required.

DELETE THE FOLLOWING IF THE PROJECT CONSISTS ONLY OF DEMOLITION AND REMOVAL WORK AND DOES NOT INCLUDE INSTALLATION OF NEW MATERIALS OR ASSEMBLIES.

- 7. For portions of the Work involving installation of new materials, assemblies or systems, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

DELETE THE REQUIREMENT BELOW IF SPECIFICATIONS DO NOT INCLUDE UNIT-COST ALLOWANCES. DO NOT CONFUSE UNIT-COST ALLOWANCES WITH UNIT PRICES. REFER TO "MASTERSPEC," NIBS "SPECTEXT," OR OTHER COMPETENT GUIDE SPECIFICATION FOR GUIDANCE IF THE PROJECT INCLUDES UNIT-COST OR OTHER TYPES OF ALLOWANCES.

- 8. **Unit-Cost Allowances:** Show the line-item value of unit-cost allowances, as a product of the unit cost, multiplied by the measured quantity. Estimate quantities from the best indication in the Contract Documents.

RETAIN THE REQUIREMENT BELOW. MODIFY AS REQUIRED TO SUIT PROJECT REQUIREMENTS. THE OWNER'S FINANCIAL ADVISORS USUALLY INSIST ON THIS REQUIREMENT.

- 9. **Margins of Cost:** Show line items for indirect costs and margins on actual costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin for each item.

REVISE THE REQUIREMENT BELOW AS NECESSARY. AS AN ALTERNATE APPROACH TO THE METHOD DESCRIBED, INCLUDE EACH CHANGE ORDER AS A NEW LINE ITEM OR A SEPARATE SHEET.

- 10. **Schedule Updating:** Update and resubmit the Schedule of Values prior to the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

REFER TO "MASTERSPEC®," NIBS "SPECTEXT®," OR OTHER COMPETENT GUIDE SPECIFICATION FOR A DISCUSSION ON WAIVERS OF LIEN AND OTHER DOCUMENTATION INVOLVED IN APPLICATION FOR PAYMENT PROCEDURES.

- A. **Each Application for Payment** shall be consistent with previous applications and payments as certified by the Designer and paid for by the Owner.
 - 1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

RETAIN THE REQUIREMENTS BELOW WHEN THE AGREEMENT STIPULATES PAYMENT DATES. THESE DATES MIGHT AFFECT THE CONTRACTOR'S NEED TO HAVE SUFFICIENT FUNDS AVAILABLE TO FINANCE CONSTRUCTION OPERATIONS. REVIEW THE DATES IN A PRECONSTRUCTION CONFERENCE IF A POTENTIAL PROBLEM ARISES.

- B. **Payment-Application Times:** Each progress-payment date is indicated in the Agreement. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

IF THE AGREEMENT DOES NOT STATE PAYMENT DATES, DELETE THE REQUIREMENTS ABOVE AND RETAIN THE REQUIREMENTS BELOW. CHANGE THE DATES IF NECESSARY TO SUIT PROJECT REQUIREMENTS.

- C. **Payment-Application Times:** The date for each progress payment is the 15th day of each month. The period covered by each Application for Payment starts on the day following the end of the preceding period and ends 15 days prior to the date for each progress payment.

GENERALLY RETAIN PARAGRAPH BELOW. REVISE IF OWNER USES ANOTHER FORM. FORMS DESCRIBED BELOW ARE AVAILABLE AT MOST AIA CHAPTER OFFICES. EJDC DOCUMENT 1910-8-E IS ANOTHER STANDARD-INDUSTRY FORM OWNERS OFTEN USE. ALTERNATE FORMS MAY INCLUDE LOCAL CONSTRUCTION-INDUSTRY FORMS OR THE LENDING INSTITUTION'S OWN STANDARD FORMS.

- D. **Payment-Application Forms:** Use AIA Document G702 and Continuation Sheets G703 as the form for Applications for Payment.

DELETE THE REQUIREMENT ABOVE AND RETAIN THE ONE BELOW IF A STANDARD-INDUSTRY FORM IS NOT USED.

- E. **Payment-Application Forms:** Use forms provided by the Owner for Applications for Payment. Sample copies are included at the end of this Section.
- F. **Application Preparation:** Complete every entry on the form. Include notarization and

execution by a person authorized to sign legal documents on behalf of the Contractor. The Designer will return incomplete applications without action.

- 1. Entries shall match data on the Schedule of Values and the Contractor's Construction Schedule. Use updated schedules if revisions were made.
- 2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

REVISE THE NUMBER OF COPIES BELOW TO SUIT OWNER'S PROJECT REQUIREMENTS.

G. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to the Designer by a method ensuring receipt within 24 hours. One copy shall be complete, including waivers of lien and similar attachments, when required.

- 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to the Designer.

INSERT INSTRUCTIONS FOR PREPARATION AND SUBMITTAL OF WAIVERS OR RELEASES HERE IF NOT STATED IN SUPPLEMENTARY CONDITIONS.

THE 2 OPTIONAL PARAGRAPHS BELOW ARE EXAMPLES OF WAYS WAIVERS OF LIEN MAY BE HANDLED. SELECT 1 OR REPLACE BOTH WITH ANOTHER EFFECTIVE METHOD. OWNER'S LEGAL COUNSEL AND FINANCIAL ADVISORS SHOULD ESTABLISH REQUIREMENTS, NOT THE DESIGNER. THERE IS A WIDE VARIANCE IN LIEN LAWS IN THE UNITED STATES.

H. Waivers of Mechanics Lien: With each Application for Payment, submit partial waivers of mechanics lien from every entity who is lawfully entitled to file a mechanics lien arising out of the Contract and related to the Work covered by the payment.

DELETE PARAGRAPH ABOVE OR PARAGRAPH BELOW.

I. Waivers of Mechanics Lien: With each Application for Payment, submit partial waivers of mechanics liens from subcontractors, sub-subcontractors and suppliers for the construction period covered by the previous application.

ON LARGE, COMPLICATED, OR EXTENSIVE SCHEDULES OF VALUES, PER ITEM WAIVERS COULD BECOME COMPLICATED. IN THIS INSTANCE THE FOLLOWING MAY NEED TO BE REVISED TO REQUIRE A PARTIAL WAIVER FOR THE TOTAL AMOUNT REQUESTED FOR EACH SUBCONTRACTOR, SUB-SUBCONTRACTOR OR SUPPLIER.

- 1. Submit partial waivers form each subcontractor, sub-subcontractor or supplier on each item provided by such an entity, for the amount requested, prior to deduction for retainage, on each item.
- 2. When an application shows completion of an item, submit final or full waivers from the subcontractors, sub-subcontractors and suppliers providing that item.
- 3. The Owner reserves the right to designate which entities involved in the Work must submit

waivers.

DELETE REQUIREMENTS BELOW ON DELAY OF WAIVERS UNLESS APPROVED BY OWNER. UNLESS PROVISIONS BELOW ARE RETAINED, THE REQUIREMENTS ABOVE MAY PUT A FINANCIAL BURDEN ON THE CONTRACTOR AND UNDUE PRESSURE ON SUBCONTRACTORS AND SUPPLIERS TO PREMATURELY WAIVE THEIR RIGHTS.

J. Waiver Delays: Submit each Application for Payment with the Contractor's waiver of mechanics lien for the period of construction covered by the application.

1. Submit final Applications for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.

DELETE THE REQUIREMENT BELOW AND INSERT A SPECIFIC FORM OR SPECIAL REQUIREMENTS WHERE PREDETERMINED.

K. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to the Owner.

L. Initial Application for Payment: Administrative actions and submittals, that must precede or coincide with submittal of the first Application for Payment, include the following:

REVISE THE LIST BELOW TO SUIT PROJECT REQUIREMENTS.

1. Submittals designated as required "Before Start of Work" by individual specification sections.
2. List of subcontractors.
3. List of principal suppliers and fabricators.
4. Schedule of Values.
5. Contractor's Construction Schedule (preliminary if not final).
6. Schedule of principal products.
7. Schedule of unit prices.
8. Submittal Schedule (preliminary if not final).
9. List of Contractor's staff assignments.
10. List of Contractor's principal consultants.
11. Copies of building permits.
12. Copies of authorizations and licenses from governing authorities for performance of the Work.
13. Initial progress report.
14. Report of preconstruction meeting.
15. Certificates of insurance and insurance policies.

DELETE ITEMS SUBMITTED BEFORE EXECUTING THE CONTRACT FROM THOSE LISTED BELOW.

- 16. Performance and payment bonds.
- 17. Data needed to acquire the Owner's insurance.
- 18. Initial settlement survey and damage report, if required.

M. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.

- 1. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- 2. Administrative actions and submittals that shall precede or coincide with this application include:

DELETE FROM AND ADD TO THE FOLLOWING LIST TO SUIT PROJECT REQUIREMENTS.

- a. Occupancy permits and similar approvals.
- b. Warranties (guarantees) and maintenance agreements.
- c. Test/adjust/balance records.
- d. Maintenance instructions.
- e. Meter readings.
- f. Startup performance reports.
- g. Changeover information related to Owner's occupancy, use, operation, and maintenance.
- h. Final cleaning.
- i. Application for reduction of retainage and consent of surety.
- j. Advice on shifting insurance coverages.
- k. Final progress photographs.
- l. List of incomplete Work, recognized as exceptions to Designer's Certificate of Substantial Completion.

N. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following:

DELETE FROM AND ADD TO THE LIST BELOW TO SUIT PROJECT REQUIREMENTS. CHECK WITH OWNER ABOUT THE NEED FOR ADDITIONAL AFFIDAVITS AND OTHER REQUIREMENTS.

- 1. Completion of Project closeout requirements.
- 2. Completion of items specified for completion after Substantial Completion.
- 3. Ensure that unsettled claims will be settled.
- 4. Ensure that incomplete Work is not accepted and will be completed without undue delay.
- 5. Transmittal of required Project construction records to the Owner.
- 6. Certified property survey.
- 7. Proof that taxes, fees, and similar obligations were paid.
- 8. Removal of temporary facilities and services.
- 9. Removal of surplus materials, rubbish, and similar elements.

- 10.** Change of door locks to Owner's access.
- 11.** Disposal receipts, bills of lading and other required documentation of transportation and disposal of asbestos-containing waste.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 01028

MODEL ASBESTOS ABATEMENT GUIDE SPECIFICATION

1996

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SCHEDULE OF VALUES:

Project: _____ Date: _____

Contractor: _____ Owner's: _____
 _____ Rep. _____

Description	Related Work Sections	Amount
Preparation of Work Area	01503 Temporary Facilities - Asbestos Abatement 01513 Temporary Pressure Differential & Air Circulation System 01526 Temporary Enclosures 01563 Decontamination Units	_____
Site Demolition	02061 Building Component Demolition - Asbestos Abatement 02062 Non-Asbestos Demolition	_____
Asbestos Abatement	02063 Removal of Asbestos Contaminated Materials 02081 Removal of Asbestos-Containing Materials 02082 Removal of Asbestos-Contaminated Soil 02084 Disposal of Regulated Asbestos-Containing Material 02085 Resilient Floor Covering Manufacturers' Recommended Work Practices 02087 Resilient Flooring Removal - Asbestos Abatement 02088 Removal of Asbestos Roofing Materials 09251 Gypsum Drywall - Asbestos Enclosure 09805 Encapsulation of Asbestos-Containing Materials	_____
Project Decontamination	01711 Project Decontamination 01712 Cleaning & Decontamination Procedures 01713 Project Decontamination - Microfibers	_____
Other Work	01046 Cutting & Patching - Asbestos-Containing Materials 01527 Regulated Areas 01528 Entry Into Controlled Areas 01529 Mini Enclosures and Glovebags 15254 Repair of Insulation and Lagging	_____
Project Closeout	01701 Project Closeout-Asbestos Abatement	_____
	Total	_____

SECTION 01043 - COORDINATION - ASBESTOS ABATEMENT

THIS SECTION IS BASED ON SECTION 01040 - "COORDINATION" FROM MASTERSPEC® TEXT COPYRIGHTED IN 1994 BY AIA, THE AMERICAN INSTITUTE OF ARCHITECTS. THE SECTION ON MEETINGS IS BASED ON SECTION 01200 - "PROGRESS MEETINGS" FROM MASTERSPEC® TEXT COPYRIGHTED IN 1994 BY AIA, THE AMERICAN INSTITUTE OF ARCHITECTS. THE SECTION ON CONTRACTORS SCHEDULE IS BASED ON SECTION 01300 - "SUBMITTALS" FROM MASTERSPEC® TEXT COPYRIGHTED IN 1994 BY AIA, THE AMERICAN INSTITUTE OF ARCHITECTS.

THIS SECTION HAS BEEN COMPLETELY REVISED TO REFLECT THE CHANGES OF THE REVISED CORRESPONDING MASTERSPEC SECTION.

THIS SECTION IS BASED ON THE PRESUMPTION THAT THE ABATEMENT CONTRACTOR WILL HAVE A CONTRACT DIRECTLY WITH THE OWNER THAT IS INDEPENDENT FROM ALL OTHER CONTRACTORS PERFORMING WORK. IT ALSO ASSUMES THAT THE CONTRACT DOCUMENTS FOR THE ABATEMENT WORK ARE COMPLETELY INDEPENDENT OF DOCUMENTS FOR OTHER PORTIONS OF THE WORK. IF A MORE COMPLICATED RELATIONSHIP EXISTS THEN THIS SECTION SHOULD BE SUBSTANTIALLY REVISED.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

IF ASBESTOS ABATEMENT WORK IS A PART OF A LARGER PROJECT, PARTICULARLY WHERE RENOVATION OF AFFECTED AREAS ARE INVOLVED, THIS SECTION SHOULD BE ENLARGED. USE LANGUAGE FOUND IN THE AMERICAN INSTITUTE OF ARCHITECTS' "MASTERSPEC BASIC", NIBS'S "SPECTEXT" OR OTHER COMPETENT GUIDE SPECIFICATION.

1.2 SUMMARY

- A. **This Section includes** administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:

DELETE REQUIREMENTS NOT INCLUDED FROM THE LIST BELOW. INSERT SPECIAL REQUIREMENTS, AS NECESSARY.

1. General project coordination procedures.
2. Conservation.
3. Plan of Action.
4. Contingency Plan.
5. Project Directory.
6. Notifications.
7. Pre-Construction Inspection.
8. Contractor's Construction Schedule.
9. Administrative and supervisory personnel.
10. Pre-Construction Conference

11. Progress Meetings
12. Coordination meetings.
13. Record Keeping.
14. Special Reports.

IF OTHER MEETINGS, SUCH AS PROJECT CLOSEOUT CONFERENCES, ARE REQUIRED, INSERT MEETING TITLES HERE AND ADD REQUIREMENTS TO THE END OF THE SECTION.

B. Related Sections: The following Sections contain requirements that relate to this Section:

REVISE SUBPARAGRAPH BELOW IF THE ASBESTOS ABATEMENT IS PART OF A LARGER PROJECT WITH MORE DETAILED SUBMITTAL REQUIREMENTS AND THE GUIDE SPEC SECTION ON SUBMITTALS HAS BEEN REPLACED WITH A MORE COMPREHENSIVE SECTION.

1. “Section 01301 - Submittals - Asbestos Abatement” for administrative procedures regarding submittals.
2. “Section 01601 - Materials and Equipment - Asbestos Abatement” for coordinating general installation.
3. “Section 01701 - Project Closeout - Asbestos Abatement” for coordinating contract closeout.

1.3 COORDINATION

REQUIREMENTS IN THIS ARTICLE AMPLIFY REQUIREMENTS IN THE GENERAL CONDITIONS. DELETE THIS ARTICLE IF THE GENERAL CONDITIONS SUIT PROJECT REQUIREMENTS AND ACTIONS SPECIFIED ARE NOT REQUIRED.

DELETE THE FOLLOWING IF THE OWNER WILL BE VACATING THE PREMISES DURING THE WORK AND THE FACILITY WILL BE VACANT.

- A. **Owner Occupancy:** Coordinate construction operations and scheduling with partial occupancy requirements of the Owner and the Owner’s use of utilities.
- B. **Coordinate construction operations** included in various Sections of these Specifications to assure efficient and orderly completion of each part of the Work. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection, and operation.
 1. Schedule construction operations in the sequence required to obtain the best results where execution of one part of the Work depends on execution of other components, before or after its own execution.

DELETE FOLLOWING IS THE WORK CONSISTS OF ONLY DEMOLITION AND REMOVAL ACTIVITIES AND THERE IS NO INSTALLATION OF NEW MATERIALS, ASSEMBLIES OR SYSTEMS.

- 2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
 - 3. Make provisions to accommodate items scheduled for later installation.
- C. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
- 1. Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.
- D. **Administrative Procedures:** Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

INSERT OTHER ADMINISTRATIVE ACTIVITIES NEEDED TO SUIT PROJECT REQUIREMENTS.

- 1. Preparation of schedules.
- 2. Installation and removal of temporary facilities.
- 3. Delivery and processing of submittals.
- 4. Progress meetings.
- 5. Project closeout activities.

CONSERVATION PROVISIONS BELOW MAY BE DIFFICULT TO ENFORCE. PENALTIES FOR WASTEFUL PRACTICES, IF NECESSARY, ARE MORE ENFORCEABLE IF MADE A CONDITION OF THE CONTRACT AND ADDED BY SUPPLEMENTARY CONDITIONS. INSERT SPECIFIC CONSERVATION REQUIREMENTS IN THE APPROPRIATE SECTIONS.

- E. **Conservation:** Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.
- 1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work.

1.4 PLAN OF ACTION:

GENERALLY DELETE THIS ARTICLE. IN A PRESCRIPTIVE SPECIFICATION IT IS PREFERABLE TO SET FORTH ALL NECESSARY REQUIREMENTS IN THE SPECIFICATIONS.

SUBMISSION OF A "PLAN OF ACTION" IS FREQUENTLY REQUIRED FOR PERFORMANCE BASED SPECIFICATIONS ON ENVIRONMENTAL REMEDIATION PROJECTS. HOWEVER, THIS EXPOSES THE OWNER, DESIGNER AND PROJECT ADMINISTRATOR TO LIABILITIES THAT DIFFER FROM THOSE OF NORMAL ARCHITECTURAL OR ENGINEERING PRACTICE. THE OWNER AND DESIGNER SHOULD REVIEW THE LIABILITY ISSUES ASSOCIATED WITH SUBMISSION OF A PLAN OF ACTION WITH AN ATTORNEY .

NORMAL PRACTICE FOR CONSTRUCTION CONTRACTS IS SET FORTH IN THE STANDARD "GENERAL CONDITIONS OF THE CONTRACT" EITHER DOCUMENT A201 PUBLISHED BY THE AMERICAN INSTITUTE OF ARCHITECTS (AIA), OR DOCUMENT 1910-8 BY THE ENGINEERS JOINT CONTRACT DOCUMENT COMMITTEE (EJCDC). BOTH DOCUMENTS MAKE THE CONTRACTOR SOLELY RESPONSIBLE FOR, "...CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES..." REQUIRING THE SUBMISSION OF A "PLAN OF ACTION," EVEN IF IT IS NOT APPROVED BY THE DESIGNER, EXPOSES THE DESIGNER TO LIABILITY FOR ACTIVITIES THAT ARE NORMALLY THE CONTRACTOR'S RESPONSIBILITY. ON ONE HAND, THE DESIGNER MAY BE ACCEPTING PART OF WHAT IN NORMAL CONSTRUCTION WOULD BE THE CONTRACTOR'S RESPONSIBILITY. THE DESIGNER MAY BE ACCEPTING SOME OF THE RESPONSIBILITY FOR THE SUCCESS OF THE "MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES," USED TO ACCOMPLISH THE WORK. THIS IS PARTICULARLY TRUE IF THE DESIGNER "APPROVES" THE SUBMITTAL. EACH DESIGNER NEEDS TO MAKE A DETERMINATION, WITH THE ADVICE OF LEGAL COUNSEL, ABOUT THE WAYS THAT AN ASBESTOS ABATEMENT PROJECT DIFFERS FROM NORMAL CONSTRUCTION, AND THE BEST WAY OF APPORTIONING RESPONSIBILITY AND THE CORRESPONDING LIABILITIES.

- A. **Prepare a detailed plan** of the procedures proposed for use in complying with the requirements of this specification. Include in the plan the location and layout of decontamination areas, the sequencing of asbestos work, the interface of trades involved in the performance of work, methods to be used to assure the safety of building occupants and visitors to the site, disposal plan including location of approved disposal site, and a detailed description of the methods to be employed to control pollution. Expand upon the use of portable HEPA ventilation system, closing out of the building's HVAC system, method of removal to prohibit visible emissions, and packaging of removed asbestos debris.
 - 1. Submit the Plan of Action to the Designer for information only, prior to the start of work.

1.5 CONTINGENCY PLAN:

- A. **Contingency Plan:** Prepare a contingency plan for emergencies or any other event that may require breaching of work area containment or modification or abridgement of decontamination or work area isolation procedures. Include in this plan procedures for performing electrical and mechanical repairs inside containment after abatement work has begun. Include in plan specific procedures for decontamination or work area isolation. Note that nothing in this specification should impede safe exiting or providing of adequate medical attention in the event of an emergency. Items to be addressed in the plan include, but are not limited to the following:

ADD OR DELETE ITEMS FROM THE FOLLOWING TO SUIT PROJECT SPECIFICS

- 1. Fire
- 2. Accident
- 3. Life threatening injury
- 4. Non life threatening injury
- 5. Rescue
- 6. Power Failure
- 7. Pressure differential system failure
- 8. Breach of containment
- 9. Electrical faults or shock
- 10. Excessive heat / cold (if/when such limits are specified)
- 11. Supplied air system failure

- 12. Water leaks
- 13. Waste spills
- 14. Unauthorized entry into work area
- 15. Elevated air samples outside of containment
- 16. Repairs inside containment
- 17. Toxic releases

1.6 PROJECT DIRECTORY

- A. **Develop a directory** of all entities involved in the project. Include the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site. Identify individuals, their duties and responsibilities. List business name, contact person, normal business and emergency telephone, pager and fax numbers and addresses of:
 - 1. Owner, Designer, and Project Administrator
 - 2. Contractor's General Superintendent, supervisory personnel and Contractor's home office
 - 3. Emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, telephone company.
 - 4. Local, state, and federal agencies with jurisdiction over the project.
- B. **Post:** Post copies of the Project Directory in the project meeting room, the temporary field office, each temporary telephone, and at entrance to clean room of Personnel Decontamination Unit

1.7 NOTIFICATIONS

- A. **Notify other entities** at the job site of the nature of the asbestos abatement activities, location of asbestos-containing materials (ACM), requirements relative to asbestos set forth in these specifications and applicable regulations. Advance notification will be made to:

RETAIN BELOW IN CASE WHERE TENANT IS PERFORMING WORK TO ENSURE OWNER IS NOTIFIED.

- 1. Owners of the building/facility;

ALWAYS RETAIN BELOW THIS IS IMPORTANT FOR MULTI-TENANTED BUILDINGS, OR WHERE OTHER CONTRACTORS WILL BE WORKING IN THE WORK AREA OR IN ADJACENT AREAS.

- 2. Employees who will perform asbestos abatement work or related activities, or who will be in the work area during the course of the work of this contract.
- 3. Employers of employees who work and/or will be working in adjacent areas during the course of the work of this contract.

- B. **Notify emergency service agencies** including fire, ambulance, police or other agency that may service the abatement work site in case of an emergency. Notification is to include methods of

entering work area, emergency entry and exit locations, modifications to fire notification or fire fighting equipment, and other information needed by agencies providing emergency services.

- C. **Notifications of Emergency:** Any individual at the job site may notify emergency service agencies if necessary without effect on this Contract or the Contract Sum.

1.8 PRE-CONSTRUCTION INSPECTION:

- A. **Inspect areas** in which work will be performed, prior to commencement of work. Prepare a listing of damage to structure, surfaces, equipment or of surrounding properties which could be misconstrued as damage resulting from the work. Photograph or videotape existing conditions as necessary to document conditions. Submit to Designer for record purposes prior to starting work.

1.9 CONTRACTOR'S CONSTRUCTION SCHEDULE

IF THE ABATEMENT WORK IS PART OF A GENERAL CONSTRUCTION CONTRACT, THE CONTRACTOR'S CONSTRUCTION SCHEDULE SHOULD BE MOVED TO THE SUBMITTALS SECTION, WHERE IT IS LOCATED IN MASTERSPEC, FOR PURPOSES OF COORDINATION WITH GENERAL CONSTRUCTION SPECIFICATIONS. INCLUDING INFORMATION ON SCHEDULE REQUIREMENTS FOR ABATEMENT WORK IN THIS SECTION IF THE BALANCE OF THE PROJECT ADDRESSED THIS ISSUE IN THE SUBMITTALS SECTION COULD LEAD TO CONFUSION.

ON SMALL PROJECTS WHERE THERE IS A SIMPLE COMPLETION DATE, A DETAILED SCHEDULE MIGHT NOT BE NECESSARY. IN THAT INSTANCE DELETE THIS ARTICLE COMPLETELY. ON THE OTHER HAND, COMPLICATED PROJECTS USUALLY HAVE MORE DETAILED SCHEDULING REQUIREMENTS THAT BEGIN WITH A PRELIMINARY SCHEDULE. IF A PRELIMINARY SCHEDULE IS TO BE USED REFER TO THE "MASTERSPEC®" DIVISION 1 SUPPLEMENTAL SECTION "SCHEDULES AND REPORTS" OR THE EQUIVALENT FROM NIBS "SPECTEXT" OR OTHER COMPETENT GUIDE SPECIFICATION.

THE BAR-CHART SCHEDULE BELOW IS ADEQUATE FOR MOST ASBESTOS ABATEMENT PROJECTS. IF PROJECT REQUIRES A CPM SCHEDULE, DELETE THIS ARTICLE; EITHER SPECIFY CONTRACTOR'S CONSTRUCTION SCHEDULE IN A SEPARATE SUPPLEMENTAL SECTION OR TRANSFER PROCEDURES FROM THAT SECTION TO THIS SECTION.

REVISE THE 30-DAY TIME PERIOD BELOW IF NECESSARY TO SUIT PROJECT.

- A. **Bar-Chart Schedule:** Prepare a fully developed, horizontal bar-chart-type, contractor's construction schedule. Submit within 30 days after the date established for "Commencement of the Work."
 - 1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values."

REVISE PERCENTAGE INCREMENTS AND TIME REQUIREMENTS BELOW TO SUIT PROJECT.

2. Within each time bar, indicate estimated completion percentage in 10 percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.
3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.
4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically the sequences necessary for completion of related portions of the Work.
5. Coordinate the Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other schedules.

THE TWO PARAGRAPHS BELOW SHOULD BE USED IF WORK AREA CLEARANCE AND SUBSTANTIAL COMPLETION ARE DIFFERENT MILESTONES. THIS WILL OCCUR WHERE THERE ARE MULTIPLE WORK AREAS OR PUT-BACK OF REMOVED INSTALLATIONS IS A PART OF THE WORK.

IF THESE TWO PARAGRAPHS ARE USED DELETE THE THIRD PARAGRAPH BELOW.

6. Indicate Clearance of each Work Area in advance of the dates established for Clearance. Allow time for testing and other Designer's procedures necessary for certification of Clearance.
7. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Designer's procedures necessary for certification of Substantial Completion.

THE TWO PARAGRAPHS ABOVE SHOULD BE DELETED AND THE FOLLOWING USED FOR SMALL PROJECTS THAT DO NOT INVOLVE REPLACEMENT OF REMOVED MATERIALS.

8. Indicate completion and Clearance of each Work Area in advance of the date established for Substantial Completion. Allow time for testing and other Designer's procedures necessary for certification of Clearance and Substantial Completion.

DELETE PARAGRAPH BELOW IF PHASING IS NOT APPLICABLE. AMPLIFY IF NECESSARY TO SUIT PROJECT.

- B. Phasing:** On the schedule, show how requirements for phased completion to permit Work by separate Contractors and partial occupancy by the Owner affect the sequence of Work.

RETAIN PARAGRAPH BELOW FOR LARGE OR COMPLICATED SMALL PROJECTS. CONSIDER LIMITING IT TO CRITICAL WORK.

- C. Work Stages:** Indicate important stages of construction for each major portion of the Work, including submittal review, testing, and installation.

REVISE FOLLOWING TO SUIT PROJECT REQUIREMENTS.

1. Non-asbestos demolitions.
2. Preparation of the Work Area.
3. Asbestos removal.
4. Clearance testing.
5. Substantial Completion.

LIST CRITICAL WORK HERE IF REQUIREMENT TO INDICATE STAGES OF WORK IS LIMITED.

RETAIN PARAGRAPH BELOW FOR HIGH-RISE BUILDINGS, MULTIPLE-BUILDING PROJECTS, AND COMPLEX STRUCTURES. DELETE FOR SMALL PROJECTS, AND LARGE SINGLE-STORY AND SINGLE-VOLUME PROJECTS.

- D. Area Separations:** Provide a separate time bar to identify each major construction area for each major portion of the Work. Indicate where each element in an area must be sequenced or integrated with other activities.

INSERT A LIST OF "MAJOR AREAS" HERE IF REQUIRED.

PARAGRAPH BELOW ESTABLISHES PROGRESS MEASURED IN TERMS OF DOLLAR VOLUME OF WORK.

- E. Cost Correlation:** At the head of the schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of Work performed as of the dates used for preparation of payment requests.
1. Refer to Division 1 Section "Applications for Payment" for cost reporting and payment procedures.
- F. Distribution:** Following response to the initial submittal, print and distribute copies to the Designer, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.
1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- G. Schedule Updating:** Revise the schedule after each meeting, event, or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.10 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

ALWAYS INCLUDE FOLLOWING AS A MINIMUM REQUIREMENT. TERMS USED TO DESCRIBE SUPERVISORY PERSONNEL VARY WIDELY BY REGION AND LOCAL AREAS. "GENERAL SUPERINTENDENT" MAY UNINTENTIONALLY DESIGNATE A NON-TRADE MANAGEMENT PERSON. THIS SECTION REQUIRES THAT THE "GENERAL SUPERINTENDENT" BE AN OSHA COMPETENT PERSON. IN SOME STATES THIS INDIVIDUAL MUST BE CERTIFIED OR LICENSED. REVISE TERMINOLOGY IN THIS SECTION TO COMPLY WITH LOCAL PRACTICE AND REQUIREMENTS.

- A. Project Supervisor: Provide a full-time Project Supervisor at the work site who is experienced in administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, project scheduling, management, etc. This person is the Contractor's Representative, and will function as the 'competent person' at the work site responsible for compliance with all applicable federal, state and local regulations, particularly those relating to ACM.

THE AHERA SUPERVISOR COURSE IS REQUIRED BY OSHA FOR A COMPETENT PERSON ON PROJECTS INVOLVING REMOVAL OF SURFACE TREATMENTS OR THERMAL SYSTEM INSULATION. THE FOLLOWING SHOULD ALSO BE INCLUDED FOR PROJECTS ON SCHOOLS THAT ARE GOVERNED BY THE AHERA REGULATION, OR WHERE STATE OR LOCAL REGULATION REQUIRES AHERA CERTIFICATION. THE AHERA COURSE IS TOO BRIEF (ONE WEEK OF TRAINING) TO BE REALISTICALLY CONSIDERED AS A CREDENTIAL. IT SHOULD BE REGARDED AS, AT BEST, A MINIMUM REQUIREMENT. AN INDIVIDUAL'S EXPERIENCE ON PAST PROJECTS WILL BE A MUCH BETTER INDICATOR OF CAPABILITY. STATE OR LOCAL REGULATION COULD IMPOSE A MORE STRINGENT STANDARDS THAN BELOW. COORDINATE WITH SECTION 01098 "CODES, REGULATIONS AND STANDARDS - ASBESTOS ABATEMENT".

- 1. Training: The General Superintendent must have a current certification from a state approved trainer for a course that meets the requirements of the EPA Model Accreditation Plan for asbestos abatement contractor/supervisor (40 CFR part 763, Subpart E, Appendix C).

THE NUMBER OF YEARS OF EXPERIENCE OR NUMBER OF SIMILAR PROJECTS IS LESS IMPORTANT THAN AN EMPLOYMENT HISTORY SHOWING PROGRESSIVELY INCREASED RESPONSIBILITY LEADING TO MANAGEMENT OF AT LEAST ONE PROJECT SIMILAR IN TYPE AND MAGNITUDE TO THE WORK OF THE CONTRACT. FLAT MINIMUM LIMITS MAY BE AN ENTRY BARRIER FOR CAPABLE, UP-AND-COMING SUPERVISORS.

- 2. Experience: The General Superintendent must have demonstrable experience in the successful management of asbestos abatement projects that are similar to the work of this contract.

THE AMOUNT AND TYPE OF EXPERIENCE REQUIRED SHOULD RELATE TO THE SIZE AND COMPLEXITY OF THE PROJECT. SELECT AN AMOUNT OF EXPERIENCE WHETHER IN YEARS OR NUMBER OF SIMILAR SIZE/TYPE OF PROJECTS BASED ON THE PROJECT'S SIZE AND COMPLEXITY. THE TWO SUB-PARAGRAPHS BELOW ARE EXAMPLES OF TYPICAL EXPERIENCE REQUIREMENTS. DELETE THE FOLLOWING AND RELY ON THE GENERAL REQUIREMENT ABOVE OR EDIT TO SUIT PROJECT SPECIFICS. FOR EXAMPLE, A TWO YEAR REQUIREMENT MAY BE MORE THAN NECESSARY FOR SIMPLE PROJECTS, BUT, IN MORE DEMANDING OR COMPLEX PROJECTS, MAY NOT BE SUFFICIENT.

- a. The General Superintendent must have a minimum of two (2) years experience in the on-site management of asbestos abatement projects.
 - b. The General Superintendent must have had responsible charge of a minimum of ten (10) asbestos abatement projects similar in size and type to the work of this contract.
- 3. Competent Person: The General Superintendent is to be a Competent Person as required by OSHA in 29 CFR 1926.

RETAIN BELOW FOR LARGE MULTI-WORKSITE ABATEMENT PROJECTS.

- B. Supervisors / Forepersons: Provide full-time Supervisors / Forepersons who are experienced in the supervision of asbestos abatement work areas including work practices, building and personnel, disposal practices, etc. These persons are contractor employees directly responsible to the General Superintendent.

EDIT BELOW IF SUPERVISORS AND FOREMEN ARE NOT REQUIRED

- C. Accreditation: The General Superintendent, Supervisors and Forepersons are to be accredited as an Asbestos Abatement Supervisor in accordance with the AHERA regulation 40 CFR Part 763, Subpart E, Appendix C.

1.11 PRE-CONSTRUCTION CONFERENCE:

THE FOLLOWING IS BASED ON PROGRESS MEETINGS CONDUCTED BY THE DESIGNER. THIS IS NORMAL PRACTICE ON ENVIRONMENTAL REMEDIATION PROJECTS. IN TRADITIONAL CONSTRUCTION PROJECTS THIS WOULD BE THE RESPONSIBILITY OF THE CONTRACTOR. REVISE THIS SECTION IF THE CONTRACTOR IS TO BE RESPONSIBLE FOR PROGRESS MEETINGS. REFER TO MASTERSPEC SECTION 01200 FOR APPROPRIATE LANGUAGE IF THE CONTRACTOR IS TO BE RESPONSIBLE FOR MEETINGS. MODIFY THE PARAGRAPH BELOW IF THE PROJECT REQUIRES MEETINGS ON A DIFFERENT SCHEDULE.

- A. **An initial progress meeting**, recognized as "Pre-Construction Conference" will be convened by the Designer prior to start of any work. The preconstruction conference will be scheduled before start of construction, at a time convenient to the Owner and the Designer, but no later than 15 days after execution of the Agreement. Meet at the project site, or as otherwise directed, with General Superintendent, Owner, Designer, Project Administrator, and other entities concerned with the asbestos abatement work.
- B. **Attendees:** Authorized representatives of the Owner, Designer, and their consultants will be in attendance. An authorized representative of the Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

REVISE PARAGRAPH BELOW IF MORE TIME IS NEEDED.

- 1. 72 hours advance notice will be provided to all participants prior to convening Pre-Construction Conference.
- C. **Agenda:** This is an organizational meeting, to review responsibilities and personnel assignments, to locate regulated areas and temporary facilities including power, light, water, etc. Items of significance that could affect progress will be discussed, including the following:

ADD ITEMS FOR DISCUSSION AS NECESSARY TO SUIT PROJECT REQUIREMENTS.

1. Tentative construction schedule.
2. Critical work sequencing.
3. Designation of responsible personnel.
4. Procedures for processing field decisions and Change Orders.
5. Procedures for processing Applications for Payment.
6. Distribution of Contract Documents.
7. Submittal of Shop Drawings, Product Data, and Samples.
8. Preparation of record documents.
9. Use of the premises.
10. Parking availability.
11. Office, work, and storage areas.
12. Equipment deliveries and priorities.
13. Safety procedures.
14. First aid.
15. Security.
16. Housekeeping.
17. Working hours.

1.12 PROGRESS MEETINGS:

THE FOLLOWING IS BASED ON PROGRESS MEETINGS CONDUCTED BY THE DESIGNER. THIS IS NORMAL PRACTICE ON ENVIRONMENTAL REMEDIATION PROJECTS. IN TRADITIONAL CONSTRUCTION PROJECTS THIS WOULD BE THE RESPONSIBILITY OF THE CONTRACTOR. REVISE THIS SECTION IF THE CONTRACTOR IS TO BE RESPONSIBLE FOR PROGRESS MEETINGS. REFER TO MASTERSPEC SECTION 01200 FOR APPROPRIATE LANGUAGE IF THE CONTRACTOR IS TO BE RESPONSIBLE FOR MEETINGS. MODIFY THE PARAGRAPH BELOW IF THE PROJECT REQUIRES MEETINGS ON A DIFFERENT SCHEDULE.

- A. General:** In addition to specific coordination and pre-installation meetings for each element of work, and other regular project meetings held for other purposes, the Designer will hold general progress meetings as required. These meeting will be scheduled, where possible, at time of preparation of payment request.

MODIFY THE PARAGRAPH BELOW IF ATTENDANCE BY OTHER KNOWN ENTITIES IS NECESSARY.

- B. Attendees:** Representatives of the Owner and Designer will attend this meetings. In addition to representatives of the Contractor, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the work. Require each entity then involved in planning, coordination or performance of work to be properly represented at each meeting.

- C. **Agenda:** Be prepared to discuss the following items at the progress meetings. Review other items of significance that could affect progress.
 - 1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time.
 - 2. Review the present and future needs of each entity present, including the following:

ADJUST THE LIST BELOW AS NECESSARY TO SUIT PROJECT REQUIREMENTS.

- a. Interface requirements.
- b. Time.
- c. Sequences.
- d. Status of submittals.
- e. Deliveries.
- f. Access.
- g. Site utilization.
- h. Temporary facilities and services.
- i. Hours of work.
- j. Hazards and risks.
- k. Housekeeping.
- l. Quality and work standards.
- m. Change Orders.
- n. Documentation of information for payment requests.

- D. **Reporting:** Revise the Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule no later than 3 days after each meeting. Include a brief summary, in narrative form, of progress since the previous meeting and report.

RETAIN THIS ARTICLE IF THERE IS A NEED FOR COORDINATION BETWEEN THE WORK OF THE ABATEMENT CONTRACT AND WORK OF OTHER CONTRACTORS. IT IS NOT UNUSUAL FOR LIABILITY AND INSURANCE CONCERNS TO RESULT IN AN ASBESTOS ABATEMENT CONTRACTOR HAVING A SINGLE PRIME CONTRACT WITH THE OWNER WORKING IN CONTRACTUAL ISOLATION EVEN WHERE THE PROJECT INVOLVES CLOSE INTERACTION WITH A NUMBER OF OTHER CONTRACTORS. THE ABATEMENT CONTRACTOR BECOMES A DE FACTO PRIME ON A MULTI-PRIME PROJECT WITHOUT BENEFIT OF THE CAREFULLY DEFINED COORDINATION MECHANISMS OF A MULTI-PRIME CONTRACT. IN THIS INSTANCE THE COORDINATION MEETING IS CRITICAL TO A SUCCESSFUL PROJECT.

1.13 COORDINATION MEETINGS

DELETE THIS ENTIRE ARTICLE IF COORDINATION WITH OTHER CONTRACTORS IS NOT REQUIRED.

FOLLOWING IS BASED UPON MEETINGS BEING HELD BY THE DESIGNER, REVISE IF ANOTHER ENTITY IS GOING TO BE CONDUCTING THE MEETINGS. MODIFY THE PARAGRAPH BELOW IF THE PROJECT REQUIRES COORDINATION MEETINGS ON A SPECIFIC SCHEDULE SUCH AS MONTHLY OR WEEKLY.

- A. **Attend project coordination meetings** that will be conducted by the Designer at regular intervals convenient for all parties involved. Project coordination meetings are intended to coordinate the work of all contractors performing work on the site, and are in addition to specific meetings held for other purposes, such as regular progress meetings.

IF OTHER MEETINGS, SUCH AS PROJECT CLOSEOUT CONFERENCES, ARE REQUIRED, INSERT NEW ARTICLES SPECIFYING MEETING REQUIREMENTS BELOW.

1.14 RECORD KEEPING:

REVISE THE FOLLOWING TO REQUIRE MAINTENANCE OF RECORDS IN PROJECT OFFICE FOR LARGER PROJECTS.

- A. **Daily Log:** Maintain a Daily Log (in an area accessible to the Owner, Designer and Project Administrator) as a bound, sequential, hand-written record carefully prepared daily that documents but is not limited to the following items:
 - 1. Meetings; purpose, attendees, brief discussion
 - 2. Special or unusual events, i.e. barrier breaching, equipment failures, accidents
 - 3. Documentation of Contractor's completion of the following:
 - a. Inspection of work area preparation prior to start of removal and daily thereafter.
 - b. Removal of any sheet plastic barriers
 - c. Contractor's inspections prior to spray back, lock back, encapsulation, enclosure or any other operation that will conceal the condition of ACM or the substrate from which such materials have been removed.
 - d. Removal of waste materials from work area
 - e. Decontamination of equipment (list items)
 - f. Contractor's final inspection/final air test analysis.

- B. **Entry/Exit Log:** Maintain within the Decontamination Unit a daily log documenting the dates and time of but not limited to, the following items:
 - 1. Visitations; authorized and unauthorized with the following information
 - a. Name
 - b. Organization
 - c. Entry time
 - d. Exit Time
 - e. Respiratory protection
 - 2. Personnel, by name, entering and leaving the work area with the following information
 - a. Printed Name
 - b. Identification Number
 - c. Entry Time
 - d. Exit Time

e. Respiratory Protection

- C. **Air Monitoring Results:** Post personnel and area air monitoring results in Decontamination Unit within 24 hours of sample collection. Post the respiratory protection requirements for the work in progress.
- D. **Records in Decontamination Unit:** Maintain the following documentation in the Decontamination Unit, in a location accessible to workers.
 - 1. Documentation of inspections by OSHA, EPA or local authority
 - 2. Respiratory Protection Program.
- E. **Other records:** Maintain other documentation in a location that is accessible to the Owner, Designer, and Project Administrator including:
 - 1. Waste Manifests and shipping records
 - 2. Landfill receipts.
 - 3. Accident reports.

1.15 SPECIAL REPORTS:

ALWAYS INCLUDE FOLLOWING AS A MINIMUM REQUIREMENT.

- A. **General:** Except as otherwise indicated, submit special reports directly to Owner within one day of occurrence requiring special report, with copy to Designer and others affected by occurrence.
- B. **Reporting Unusual Events:** When an event of unusual and significant nature occurs at site (examples: failure of pressure differential system, rupture of temporary enclosures), prepare and submit report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. When such events are known or predictable in advance, advise Owner in advance at earliest possible date.

ABOVE AND BELOW ARE TYPICAL EXAMPLES. USUALLY RETAIN ABOVE FOR UNUSUALLY PUBLIC RELATIONS SENSITIVE OWNERS; OTHERWISE, SUCH EVENTS MAY GET LOST IN REGULAR DAILY REPORTS.

- C. **Reporting Accidents:** Prepare and submit reports of significant accidents, at site and anywhere else work is in progress. Record and document data and actions; comply with industry standards. For this purpose, a significant accident is defined to include events where personal injury is sustained, property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury, or where work was stopped for over four hours during a scheduled shift.
- D. **Report Discovered Conditions:** When an unusual condition of the building is discovered during the work (e.g. leaks, termites, corrosion) prepare and submit a special report indication condition discovered.

1.16 SUBMITTALS

IT IS A GOOD IDEA TO INSIST THAT PRE-CONSTRUCTION SUBMITTALS BE COMPLETE BEFORE THE CONTRACTOR ARRIVES AT THE JOBSITE. OTHERWISE IT CAN BE DIFFICULT TO GET SUBMITTALS FROM THE CONTRACTOR, PARTICULARLY ON SMALL PROJECTS.

SAFETY AT THE JOB SITE IS THE CONTRACTOR'S RESPONSIBILITY. REQUIRING SUBMITTALS THAT ARE CONCERNED WITH JOB SITE SAFETY AND WORK PRACTICES INCREASES THE OWNER'S AND DESIGNER'S INVOLVEMENT IN THE CONTRACTOR'S OPERATIONS. THIS CHANGES THE DISTRIBUTION OF RESPONSIBILITY AND LIABILITY FROM THAT OF NORMAL CONSTRUCTION PRACTICE. THIS IS TRUE EVEN IF THE SUBMITTALS ARE ONLY RECEIVED AND ARE NOT REVIEWED OR APPROVED.

THE PARAGRAPH BELOW REQUIRES THAT THE CONTRACTOR SUBMIT A NUMBER OF ITEMS THAT ARE INVOLVED WITH THE CONTRACTOR'S WORK PRACTICES AND HEALTH AND SAFETY ISSUES. THIS INCREASES THE DESIGNER'S RESPONSIBILITY FOR THE WORK PRACTICES AND SAFETY PROCEDURES BEYOND NORMAL CONSTRUCTION PRACTICE. HOWEVER, THIS PARAGRAPH INCREASES THIS RESPONSIBILITY LESS THAN WOULD BE THE CASE IF THE DESIGNER REVIEWED AND APPROVED THESE SUBMISSIONS.

REQUIRING APPROVAL OF SUCH SUBMITTALS WOULD MAKE THE DESIGNER SUBSTANTIALLY MORE RESPONSIBLE FOR THE SUCCESS OF THE WORK PRACTICES USED AND FOR WORKER SAFETY THAN WOULD BE THE CASE IN NORMAL CONSTRUCTION. THIS WOULD EXPOSE THE DESIGNER TO SUBSTANTIALLY DIFFERENT, AND PERHAPS GREATER, LIABILITY. THE ERRORS AND OMISSIONS INSURANCE OF THE DESIGNER MAY NOT COVER SITUATIONS WHERE THE DESIGNER "APPROVES" SUBMITTALS SUCH AS A "PLAN OF ACTION." EACH DESIGNER NEEDS TO MAKE A DETERMINATION, WITH ADVICE OF LEGAL COUNSEL, ABOUT THE BEST WAY OF DEALING WITH THE RESPONSIBILITIES AND LIABILITIES OF ASBESTOS ABATEMENT PROJECTS.

THE FOLLOWING REQUIRES ACKNOWLEDGMENT OF RECEIPT BY THE DESIGNER RATHER THAN REVIEW AND APPROVAL OF THE LISTED SUBMITTALS. IN THIS MANNER THE DESIGNER IS NOT APPROVING JOB SITE SAFETY PROCEDURES. THE DESIGNER SHOULD NOT BE IN THE POSITION OF APPROVING THE CONTRACTOR'S SAFETY PROCEDURES.

- A. Before the Start of Work:** Submit the following to the Designer in the same manner as product data. Do not begin work until these submittals are returned with designer's action stamp indicating that all submittals have been "received-not reviewed".
 - 1. Plan of Action.
 - 2. Contingency Plans.
 - 3. Project Directory.
 - 4. Notifications: copy of notification sent to other entities at the work site, and to emergency service agencies.
 - 5. Pre-Construction Inspection: Report on inspection carried out as required by this section. Include copies of all photographs, video tapes, etc.
 - 6. Contractor's Construction Schedule.
 - 7. Accreditation: Submit evidence in the form of training course certificates for the General Superintendent, Supervisors, and Forepersons as asbestos abatement supervisors in accordance with AHERA requirements. Submit evidence in the form of training course certificates that each worker is trained as an asbestos abatement worker in accordance with AHERA requirements.

8. Resume: Submit resume of General Superintendent

- B. **Submit daily:** Provide two (2) copies for information purposes of all documents indicated in the following sub-sections to Project Administrator by end of the next working day after the day they are received by Contractor.
 1. Section on Record Keeping.
 2. Section on Special Reports.

- C. **Project Close-out:** Submit two (2) copies for information purposes of all documents indicated in the following sections at final closeout of project as a project close-out submittal.
 1. Section on Record Keeping.
 2. Section on Special Reports.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

IF REPLACEMENT OF MATERIALS IS TO BE PART OF THE CONTRACT REFER TO "MASTERSPEC-BASIC", NIBS'S "SPECTEXT", OR OTHER COMPETENT GUIDE SPECIFICATION FOR LANGUAGE AND PROVISIONS RELATING TO CLEANING AND PROTECTION, AND CUTTING AND PATCHING.

END OF SECTION - 01043

SECTION 01046 - CUTTING AND PATCHING ASBESTOS-CONTAINING MATERIALS

GENERAL COMMENTS

This section describes procedures to be used if asbestos-containing materials must be cut and patched. This section is intended to be used with several other sections to write specifications for O&M work that is going to be hired out to an asbestos abatement contractor rather than being performed by facility maintenance staff. O&M programs are frequently structured so that work that can be accomplished while avoiding ACM is carried out by facility staff, and work that actually disturbs ACM is contracted out. NIBS publishes a manual on the design of asbestos O&M programs and work practices: *GUIDANCE MANUAL, Asbestos Operations & Maintenance Work Practices*. Refer to the NIBS O&M Manual, the introduction, and the evaluation for section 02083 for more discussion on the design of asbestos O&M programs.

- **01527 Regulated Areas:** This section provides the language for specifying the set up of a regulated area, as required by OSHA, in the area in which operations and maintenance work is to take place.
- **01528 Entry Into Controlled Areas:** Requirements for O&M activities such as entry into a space above a suspended ceiling where there is an asbestos-containing fireproofing are set forth in this section.
- **01560 Worker Protection - Repair and Maintenance:** describes the training, equipment and procedures necessary to protect workers against asbestos contamination and other work place hazards during maintenance activities. Respiratory protection is covered in the following section.
- **01562 Respiratory Protection:** Establishes procedures and equipment for adequate protection against inhalation of airborne asbestos fibers.

The following sections are also intended to be

used in securing contractor services in support of an operations and maintenance program. The specifications of the contracted portion of a typical asbestos O&M program will probably include most or all of the following sections. These sections need to be combined with the administrative specification sections and the other parts of the contract. Refer to the introduction for more information on the administrative specification sections and the necessary parts necessary for a complete set of Contract Documents.

- **01529 Mini-enclosures and Glovebags:** Control procedures for maintenance activities that involve the disturbance of small areas of asbestos-containing materials, but for which there is no negative exposure assessment, or that involve drilling, cutting, abrading, sanding, chipping, breaking or sawing of TSI or surfacing material are set forth in this section.
- **01712 Cleaning and Decontamination Procedures:** Sets forth procedures to clean up asbestos debris and dust, and procedures to decontaminate objects and rooms.
- **02083 Disturbance of ACM During O&M Work:** This section is used to specify the O&M work activities for which there is a negative exposure assessment, and the work is performed in the open. Work of this section is performed in a regulated area.
- **02084 Disposal of Asbestos-Containing Waste Material:** The requirements for the proper containing, transport and disposal of asbestos waste are set forth in this section.
- **Section 02085 Resilient Flooring Removal - Resilient Floor Covering Manufacturers'**

Recommended Non-Aggressive Work

Practices: This section describes the work practices for intact removal of resilient flooring, and the requirements for a negative exposure assessment for this sort of work. This section is written to be a “stand-alone” performance based specification for resilient flooring removal. It could be used to bid this work separately from other O&M work. Revision would be required to make this

section work with the other O&M sections. However, the necessary work practices can be excerpted from “Part 3- Execution” of this section and inserted in Section 02083.

- **15254 Repair of Insulation and Lagging:** Describes repair of insulation on pipes and other equipment using procedures that involve primarily bridging encapsulants and fabric reinforcing.

SECTION 01046 - CUTTING AND PATCHING - ASBESTOS-CONTAINING MATERIALS

REFER TO SECTION 01045 - "CUTTING AND PATCHING" FROM MASTERSPEC® TEXT COPYRIGHTED IN 1994 BY AIA, THE AMERICAN INSTITUTE OF ARCHITECTS.

PART 1 - GENERAL

THIS SECTION APPLIES ONLY TO CLASS III ASBESTOS WORK. THIS INCLUDES REPAIR AND MAINTENANCE OPERATIONS, WHERE ACM, INCLUDING THERMAL INSULATION AND SURFACING MATERIAL OR NON FRIABLE MATERIALS THAT GENERATES NO MORE WASTE THAN ONE DISPOSAL BAG, ARE LIKELY TO BE DISTURBED. USE THE APPROPRIATE GUIDE SPECIFICATION SECTIONS FOR OTHER TYPES OF WORK.

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division - 1 Specification Sections, apply to work of this section.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

EDIT FOLLOWING TO MATCH WORK SPECIFIED. IN CLASS III WORK INVOLVING THE "DRILLING, CUTTING, ABRADING, ETC" OF TSI OR SURFACING MATERIAL, A GLOVEBAG OR MINI ENCLOSURE IS NEEDED. IF THE WORK DOES NOT INVOLVE TSI OR SURFACING MATERIAL, BUT THERE IS NO NEGATIVE EXPOSURE ASSESSMENT, OR ACTUAL MONITORING SHOWS THAT THE PEL IS EXCEEDED, ENCLOSURES ARE ALSO REQUIRED

- A. Procedures for building small containment areas are specified in Section 01529 Mini Enclosures and Glovebags
- B. Procedures for sealing exposed edges are specified in Section 09805 Encapsulation of Asbestos-Containing Materials
- C. Procedures for disposal of waste are specified in Section 02084 Disposal of Regulated Asbestos Containing Materials

1.3 SUBMITTALS

- A. **Before the Start of Work:** Submit Product Data Sheets for the following to the Designer for review. Begin no work until these submittals are returned with Designer's action stamp indicating that the submittal is "Received-Not Reviewed."
 - 1. Tools: equipped with HEPA vacuum dust collection attachments

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. Provide local exhaust ventilation systems that comply with ANSI Z9.2

2.2 PRODUCTS

- A. Products for encapsulation are specified in Section 09805.

PART 3 - EXECUTION

3.1 WORK PRACTICES

- A. Before beginning work of this section, comply with:
 - 1. Section 01527 - Regulated Areas
 - 2. Section 01561 - Worker Protection - Repair & Maintenance
 - 3. Section 01562 - Respiratory Protection
- B. Perform cutting, drilling, abrading, or otherwise penetrating any asbestos-containing material in a manner that will minimize the dispersal of asbestos fibers into the air.
- C. Provide adequate local exhaust to capture fibers produced by cutting, drilling, or abrading by means of an approved High Efficiency Particulate Absolute (HEPA) filter vacuum. Use specialized equipment such as drills or saws having integral ventilation hoods which are connected to a HEPA vacuum with a flexible hose. Handle and dispose of HEPA filters as contaminated material in accordance with requirements of Section 02084 "Disposal of Regulated Asbestos-Containing Material."
- D. Thoroughly saturate absorbent surfaces of asbestos-containing material to be penetrated with a penetrating type encapsulant. Allow encapsulant to penetrate to substrate before working on materials.
- E. Seal edges of asbestos-containing material exposed by cutting, drilling, or abrading, etc. with two (2) coats of an approved penetrating encapsulant applied in accordance with manufacturers' printed instruction for use of the encapsulant as an asbestos coating and requirements of Section 09805.

END OF SECTION - 01046

SECTION 01097 - REFERENCE STANDARDS AND DEFINITIONS - ASBESTOS ABATEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

BASED ON SECTION 01095 "REFERENCE STANDARDS AND DEFINITIONS FROM MASTERSPEC® TEXT COPYRIGHTED IN 1994 BY AIA, THE AMERICAN INSTITUTE OF ARCHITECTS.

THIS SECTION USES THE TERM DESIGNER. CHANGE THIS TERM AS NECESSARY TO MATCH THE ACTUAL TERM USED TO IDENTIFY THE DESIGN PROFESSIONAL AS DEFINED IN THE GENERAL AND SUPPLEMENTARY CONDITIONS.

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

1.2 DEFINITIONS

TERMS DEFINED BELOW ARE NOT DEFINED IN THE AIA OR EJDC STANDARD GENERAL CONDITIONS. THE DEFINITIONS BELOW COULD BE INCLUDED HERE OR IN SUPPLEMENTARY CONDITIONS.

DELETE THIS ENTIRE ARTICLE OR SELECTED PARAGRAPHS IN THE ARTICLE IF DEFINITIONS BELOW ARE INCLUDED ELSEWHERE IN THE PROJECT MANUAL OR ARE NOT REQUIRED.

- A. **General:** Basic contract definitions are included in the Conditions of the Contract.
 - 1. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, or other paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the reader locate the reference. Location is not limited.

THE FOLLOWING 2 PARAGRAPHS CLARIFY THE MEANING OF A NUMBER OF TERMS COMMONLY USED IN WRITING SPECIFICATIONS. THESE PARAGRAPHS SERVE MORE AS AN EXPLANATION OF INTENT THAN A DEFINITION OF TERMS. WHEN USING THESE TERMS BE AWARE OF THE FOLLOWING PARAGRAPHS, AND DO NOT EXTEND THE DESIGNER'S RESPONSIBILITY INTO THE CONTRACTOR'S AREA OF MEANS, METHODS, AND TECHNIQUES OF CONSTRUCTION.

- 2. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the Designer, requested by the Designer, and similar phrases.
- 3. "Approved": The term "approved," when used in conjunction with the Designer's action on the Contractor's submittals, applications, and requests, is limited to the Designer's duties and responsibilities as stated in the Conditions of the Contract.

4. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

AVOID MODIFYING 3 PARAGRAPHS BELOW BECAUSE OF THE WIDESPREAD ACCEPTANCE AND UNDERSTANDING OF THE TERMS AS DEFINED.

5. "Furnish": The term "furnish" means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.
6. "Install": The term "install" describes operations at the Project Site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
7. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

RETAIN PARAGRAPH BELOW WHERE "QUALITY ASSURANCE" ARTICLES IN OTHER SECTIONS INCLUDE PARAGRAPHS SPECIFYING INSTALLER QUALIFICATIONS. DELETE IF USE OF THE TERM IS PROHIBITED.

8. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.

REVISE THE NUMBER OF PROJECTS IN SUBPARAGRAPH BELOW TO SUIT OFFICE POLICY AND OWNER'S REQUIREMENTS. DELETE IF EXPERIENCE REQUIREMENTS ARE INCLUDED IN INDIVIDUAL SECTIONS OF THE SPECIFICATIONS.

- a. The term "experienced," when used with the term "installer," means having a minimum of 5 previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of authorities having jurisdiction.

GENERALLY RETAIN SUBPARAGRAPH BELOW. IT IS HELPFUL TO AVOID UNREASONABLE CLAIMS.

- b. Trades: Using terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades persons of the corresponding generic name.

DELETE SUBPARAGRAPH BELOW UNLESS OTHER SPECIFICATION SECTIONS ASSIGN CERTAIN ITEMS OF WORK TO PRESELECTED CONTRACTORS (SPECIALISTS). MODIFY IF NECESSARY TO SUIT PROJECT.

- c. Assigning Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no option. However, the ultimate responsibility for fulfilling contract requirements remains with the Contractor.
 - 1) This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade-union jurisdictional settlements and similar conventions.

GENERALLY RETAIN PARAGRAPH BELOW BUT MODIFY TO SUIT PROJECT.

- 9. "Project Site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction, with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.
- 10. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

THE FOLLOWING CLARIFIES THE DESIGNERS ROLE IN THE PROJECT. IF ASBESTOS ABATEMENT WORK IS PART OF A LARGER PROJECT WHERE THERE ARE SPECIFICATION SECTIONS THAT REFER TO THE ARCHITECT OR ENGINEER, THIS DEFINITION SHOULD BE FURTHER CLARIFIED. EDIT THE DEFINITIONS BELOW TO SUIT THE REQUIREMENTS OF THE PROJECT.

- 11. "Designer": This is the entity described as the "Architect" in AIA Document A201 "General Conditions of the Contract for Construction," or is the entity described as "Engineer" in Engineers Joint Contract Document Committee (EJCDC) Document 1910-8 "Standard General Conditions of the Construction Contract." All references to Architect or Engineer in the Contract Documents in all cases refer to the Designer. The Designer will represent the Owner during construction and until final payment is due. The Designer will advise and consult with the Owner. The Owner's instructions to the Contractor will be forwarded through the Designer.

THE FOLLOWING DEFINES THE PROJECT ADMINISTRATOR AS AN AGENT OF THE OWNER RATHER THAN THE DESIGNER. THIS FOLLOWS NORMAL CONSTRUCTION PRACTICE AND BECOMES PARTICULARLY IMPORTANT WHEN A STOP WORK ORDER IS ISSUED. THIS DOES INVOLVE THE OWNER IN A MUCH MORE PRO-ACTIVE ROLE IN THE CONSTRUCTION PROCESS THAN IS NORMAL FOR ORDINARY CONSTRUCTION. IF THE DESIGNER AGREES TO ACCEPT THIS RESPONSIBILITY THE FOLLOWING WILL HAVE TO BE REVISED. THIS DEFINITION SHOULD BE REVIEWED BY COUNSEL. REFER TO THE DISCUSSION ON "STOP WORK" IN SECTION 01013 AND IN THE INTRODUCTION.

- 12. "Project Administrator": This is the entity described as the "Project Representative" in AIA Document A201 "General Conditions of the Contract for Construction," or is the

entity described as "Engineer" in Engineers Joint Contract Document Committee (EJCDC) Document 1910-8 "Standard General Conditions of the Construction Contract." The Project Administrator is a full time representative of the Owner at the job site with authority to stop the work upon written or verbal order if requirements of the Contract Documents are not met, or if in the sole judgement of the Project Administrator, Designer, or Owner, the interests of the Owner, safety of any person or the Owner's property are jeopardized by the work.

13. "Stop Work Order": is a written order to cease asbestos removal, encapsulation or enclosure activities. The Contractor must maintain work area enclosure, pressure differential isolation and ventilation of the work area, and decontamination units during the period that a Stop Work Order is in affect.

EDIT THE DEFINITION BELOW TO SUIT PROJECT. ON LARGE ABATEMENT JOBS THE GENERAL SUPERINTENDENT COULD BE AN ADMINISTRATIVE POSITION, AND THERE MAY NEED TO BE A NUMBER OF "COMPETENT PERSONS" FOR EACH CREW OR WORK AREA.

14. "General Superintendent": This is the Contractor's Representative at the work site. This person must be a Competent Person as defined by OSHA in 29 CFR 1926.

B. Definitions Relative to Asbestos Abatement:

EDIT THE DEFINITIONS BELOW TO SUIT THE REQUIREMENTS OF THE PROJECT. DELETE ALL DEFINITIONS THAT DO NOT RELATE TO THE PROJECT.

1. "Adequately Wet" means to sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions are observed coming from the asbestos-containing material (ACM), then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wetted.
2. "Asbestos": The asbestiform varieties of chrysotile (serpentine), amosite (cummingtonite-grunerite), crocidolite (riebeckite), tremolite, anthophyllite, actinolite, and any of these minerals that has been chemically treated and/or altered. For purposes of the contract documents materials described in the contract documents as asbestos are to be considered as asbestos.
3. "Asbestos-Containing Material (ACM)": Any material containing more than 1% asbestos as determined using the methods specified in appendix A, subpart F, 40 CFR part 763, section 1, Polarized Light Microscopy.
4. "Asbestos-Containing Waste Material": any waste that contains asbestos. This term includes filters or other materials contaminated with asbestos. This term also includes regulated asbestos-containing material waste and materials contaminated with asbestos including disposable equipment and clothing.

5. "Asbestos debris": pieces of ACM that can be identified by color, texture, or composition, or dust, if the dust is determined by an accredited inspector to be ACM.
6. "Certified Industrial Hygienist (C.I.H.)": one certified in the practice of industrial hygiene by the American Board of Industrial Hygiene.
7. "Competent person" : an individual who meets the requirements of OSHA as a "competent person" for the specific activity involved in the work. The "competent person" must meet the requirements of 29 CFR 1926.32(f), and 29 CFR 1926.1101.
8. "Filter": A media component used to remove solid or liquid particles from air and water.
9. "Friable Asbestos": any asbestos-containing material that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.
10. "Grinding" : to reduce to powder or small fragments and includes manual or mechanical chipping or drilling.
11. "HEPA Filter": A High Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97% of all mono-dispersed particles of 0.3 microns in diameter.
12. "HEPA Filter Vacuum Collection Equipment (or vacuum cleaner)": High efficiency particulate air filtered vacuum collection equipment with a HEPA filter.
13. "Intact" : that the ACM has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix.
14. "Leak-tight" : that solids or liquids cannot escape or spill out. It also means dust-tight.
15. "Negative Pressure Enclosure (NPE) ": A pressure differential and ventilation system where the work area is maintained at a negative pressure relative to air pressure outside the work area.
16. "Nonfriable Material" : any material that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure and has not been rendered friable.
17. "Personal Monitoring": Sampling of the asbestos fiber concentrations within the breathing zone of an employee.
18. "Surfacing material" : material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes).
19. "Thermal system insulation (TSI)" : insulation applied to pipes, fittings, boilers, breeching, tanks, ducts or other components to prevent heat loss or gain.

- 20. "Time Weighted Average (TWA)": The average concentration of a contaminant in air during a specific time period as determined by the method prescribed in Appendix A of 29 CFR part 1926.1101.
- 21. "Visible Emissions": Any emissions containing particulate material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.

THE BELOW DEFINITION IS USED FOR NESHAP NOTIFICATION REQUIREMENTS.

- 22. "Working Day" : Monday through Friday and includes holidays that fall on any of the days Monday through Friday as indicated in the notification requirements.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

DELETE THIS ARTICLE OR PORTIONS OF THIS ARTICLE IF INFORMATION IS UNNECESSARY.

EXPAND PARAGRAPH BELOW IF A MORE DETAILED EXPLANATION OF THE FORMAT USED IS REQUIRED. DELETE OR REVISE ENTIRELY IF CSRF'S 16-DIVISION FORMAT IS NOT USED.

- A. **Specification Format:** These Specifications are organized into Divisions and Sections based on CSRF's 16-Division format and MasterFormat's numbering system.

IF NECESSARY, INSERT PARAGRAPHS EXPLAINING THE SECTION-NUMBERING AND PAGE-NUMBERING SYSTEMS USED. IF NECESSARY, ADD AN EXPLANATION OF LINE-NUMBERING OR ALPHANUMERIC PARAGRAPH-OUTLINE SYSTEM USED IN THE SPECIFICATION AND THE METHOD OF TEXT SUBORDINATION.

- B. **Specification Content:** This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
 - 1. **Abbreviated Language:** Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
 - 2. **Streamlined Language:** The Specifications generally use the imperative mood and streamlined language. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity

to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.

INSERT AN ARTICLE ON SPECIAL COMPLIANCE WITH A GOVERNING CODE ONLY IF NECESSARY. PROVISIONS OF THIS NATURE BELONG IN SUPPLEMENTARY CONDITIONS.

POSSIBLY INSERT ARTICLE ON SPECIAL OR UNIQUE GENERAL COMPLIANCE WITH A GOVERNING CODE. PROVISIONS OF THIS NATURE BELONG IN SUPPLEMENTARY CONDITIONS; CONSULT OWNER'S COUNSEL.

1.4 INDUSTRY STANDARDS

- A. **Applicability of Standards:** Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

RETAIN PARAGRAPH BELOW UNLESS THE ENTIRE SPECIFICATION IS EDITED TO INSERT DATES (THOUGH THIS IS NOT RECOMMENDED) AND UNREFERENCED STANDARDS ARE NOT APPLICABLE. REVISE THE DATE ESTABLISHED BELOW TO COMPLY WITH PROJECT REQUIREMENTS.

- B. **Publication Dates:** Comply with the standards in effect as of the date of the Contract Documents.

PARAGRAPHS BELOW MAY RESOLVE PROBLEMS THAT SOMETIMES ARISE USING REFERENCE STANDARDS.

- C. **Conflicting Requirements:** Where compliance with 2 or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer to the Designer before proceeding for a decision on requirements that are different but apparently equal, and where it is uncertain which requirement is the most stringent.
 - 1. **Minimum Quantity or Quality Levels:** The quantity or quality level shown or specified shall be the minimum acceptable. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Designer for a decision before proceeding.
- D. **Copies of Standards:** Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.

- E. **Standards:** which apply to asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:

ALWAYS INCLUDE THE FOLLOWING AS THESE SET FORTH THE STANDARDS FOR HEPA FILTERED FAN UNITS (SOMETIMES REFERRED TO AS NEGATIVE AIR MACHINES), HEPA VACUUMS AND RESPIRATORY PROTECTION.

- 1. American National Standards Institute (ANSI)
 - 1430 Broadway
 - New York, New York 10018
 - (212)354-3300
 - a. Fundamentals Governing the Design and Operation of Local Exhaust Systems Publication Z9.2
 - b. Practices for Respiratory Protection Publication Z88.2
- 2. American Society for Testing and Materials (ASTM)
 - 100 Bar Harbor Drive
 - West Conshocken, PA 19428-2959
 - (610) 832-9585
 - a. Safety and Health Requirements Relating to Occupational Exposure to Asbestos E 849

DELETE THE FOLLOWING IF THERE IS NO ENCAPSULATION IN THE WORK.

- b. ASTM Standard Practice for Encapsulants for Spray-or-Trowel-Applied Friable Asbestos-Containing Building Materials E1494

THE FOLLOWING STANDARD HAS BE REGARDED BY SOME TO BE TOO COMPREHENSIVE FOR MOST ABATEMENT PROJECTS.

- c. ASTM Standard Practice for Visual Inspection of Asbestos Abatement Projects E1368

- F. **Abbreviations and Names:** Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to Gale Research Co.'s "Encyclopedia of Associations," available in most libraries.

DELETE EITHER PARAGRAPH ABOVE OR BELOW. IF PARAGRAPH BELOW IS DELETED, ALSO DELETE LIST OF ACRONYMS THAT FOLLOWS IT. THE SPECIFICATION TEXT ASSUMES LIST IS RETAINED.

- G. Abbreviations and Names:** Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in the Contract Documents, are defined to mean the associated names. Names and addresses are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the Contract Documents.

DELETE ENTRIES BELOW NOT REFERENCED IN THE SPECIFICATION. INSERT ACRONYMS AND NAMES USED IN THE SPECIFICATION OR ADDED TO THE OFFICE MASTER. A LIST OF FEDERAL AGENCIES THAT ALSO PRODUCE STANDARDS FOLLOWS THIS LIST.

1. ACI American Concrete Institute
P.O. Box 19150
Detroit, MI 48219 (313) 532-2600
2. ACIL American Council of Independent Laboratories
1629 K St., NW
Washington, DC 20006 (202) 887-5872
3. ACPA American Concrete Pipe Assoc.
8300 Boone Blvd., Suite 400
Vienna, VA 22182 (703) 821-1990
4. ACGIH American Conference of Governmental Industrial Hygienists
1330 Kemper Meadow Dr.
Cincinnati, OH 45240 (513) 742-2020
5. AIA The American Institute of Architects
1735 New York Ave., NW
Washington, DC 20006 (202) 626-7300
6. AIHA American Industrial Hygiene Assoc.
2700 Prosperity Ave., Suite 250
Fairfax, VA 22031 (703) 849-8888
7. ANSI American National Standards Institute
11 West 42nd St., 13th Floor
New York, NY 10036 (212) 642-4900
8. ASHRAE American Society of Heating,
Refrigerating and Air-Conditioning Engineers
1791 Tullie Circle, NE
Atlanta, GA 30329 (404) 636-8400
9. ASME American Society of Mechanical Engineers

345 East 47th St.
New York, NY 10017 (212) 705-7722

10. ASPE American Society of Plumbing Engineers
3617 Thousand Oaks Blvd., Suite 210
Westlake, CA 91362 (805) 495-7120
11. ASTM American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959 (610) 832-9585
12. CGA Compressed Gas Assoc.
1725 Jefferson Davis Highway, Suite 1004
Arlington, VA 22202-4100 (703) 412-0900
13. FM Factory Mutual Systems
1151 Boston-Providence Turnpike
P.O. Box 9102
Norwood, MA 02062 (617) 762-4300
14. GA Gypsum Association
810 First St., NE, Suite 510
Washington, DC 20002 (202) 289-5440
15. IEEE Institute of Electrical and Electronic Engineers
345 E. 47th St.
New York, NY 10017 (212) 705-7900
16. IETA International Electrical Testing Assoc.
P.O. Box 687
Morrison, CO 80465 (303) 697-8441
17. IRI Industrial Risk Insurers
P.O. Box 5010
85 Woodland St.
Hartford, CT 06102-5010 (203) 520-7300
18. ISA Instrument Society of America
P.O. Box 12277
67 Alexander Dr.
Research Triangle Park, NC 27709 (919) 549-8411
19. ISO International Standards Organization

- 20. NEC National Electrical Code (from NFPA)
- 21. NECA National Electrical Contractors Assoc.
3 Bethesda Metro Center, Suite 1100
Bethesda, MD 20814 (301) 657-3110
- 22. NEMA National Electrical Manufacturers Assoc.
2101 L St., NW, Suite 300
Washington, DC 20037 (202) 457-8400
- 23. NFPA National Fire Protection Assoc.
One Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101 (617) 770-3000 (800) 344-3555
- 24. NRCA National Roofing Contractors Assoc.
10255 W. Higgins Rd., Suite 600
Rosemont, IL 60018-5607 (708) 299-9070
- 25. RFCI Resilient Floor Covering Institute
966 Hungerford Dr., Suite 12-B
Rockville, MD 20805 (301) 340-8580
- 26. UL Underwriters Laboratories
333 Pfingsten Rd.
Northbrook, IL 60062 (708) 272-8800
- 27. White Lung Association
PO Box 1483
Baltimore, MD 21203

DELETE LIST OF FEDERAL AGENCIES BELOW IF LIST OF ASSOCIATION ACRONYMS ABOVE IS DELETED. THE TEXT OF SPECIFICATION SECTIONS ASSUMES LIST IS RETAINED.

H. Federal Government Agencies: Names and titles of federal government standard- or Specification-producing agencies are often abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard- or Specification-producing agencies of the federal government. Names and addresses are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the Contract Documents.

DELETE ACRONYMS AND NAMES OF GOVERNMENT AGENCIES IN LIST BELOW NOT REFERENCED IN THE SPECIFICATION.

- 1. CE Corps of Engineers

- (U.S. Department of the Army)
Chief of Engineers - Referral
Washington, DC 20314 (202) 272-0660
2. CFR Code of Federal Regulations
(Available from the Government Printing Office)
N. Capitol St. between G and H St., NW
Washington, DC 20402 (202) 783-3238
(Material is usually first published in the "Federal Register")
 3. CPSC Consumer Product Safety Commission
5401 Westbard Ave.
Bethesda, MD 20207 (800) 638-2772
 4. CS Commercial Standard
(U.S. Department of Commerce)
Government Printing Office
Washington, DC 20402 (202) 783-3238
 5. DOC Department of Commerce
14th St. and Constitution Ave., NW
Washington, DC 20230 (202) 482-2000
 6. DOT Department of Transportation
400 Seventh St., SW
Washington, DC 20590 (202) 366-4000
 7. EPA Environmental Protection Agency
401 M St., SW
Washington, DC 20460 (202) 260-2090
 8. FS Federal Specification (from GSA)
Specifications Unit (WFSIS)
7th and D St., SW
Washington, DC 20407 (202) 708-9205
 9. GSA General Services Administration
F St. and 18th St., NW
Washington, DC 20405 (202) 708-5082
 10. MIL Military Standardization Documents
(U.S. Department of Defense)

Naval Publications and Forms Center
5801 Tabor Ave.
Philadelphia, PA 19120

11. NIST National Institute of Standards and Technology
(U.S. Department of Commerce)
Gaithersburg, MD 20899 (301) 975-2000
12. OSHA Occupational Safety and Health Administration
(U.S. Department of Labor)
200 Constitution Ave., NW
Washington, DC 20210 (202) 219-6091
13. PS Product Standard of NBS
(U.S. Department of Commerce)
Government Printing Office
Washington, DC 20402 (202) 783-3238
14. USPS U.S. Postal Service
475 L'Enfant Plaza, SW
Washington, DC 20260-0010 (202) 268-2000

CONSIDER ADDING STATE AND LOCAL STANDARDS-PRODUCING AGENCIES, SUCH AS STATE HIGHWAY DEPARTMENTS, SOIL CONSERVATION AGENCIES, AND SIMILAR ENVIRONMENTAL DEPARTMENTS.

REVIEW THE FOLLOWING PARAGRAPH WITH THE OWNER'S COUNSEL AND DELETE OR MODIFY AS APPROPRIATE FOR BOTH THE PROJECT AND THE LOCATION. THIS PARAGRAPH IS BELIEVED TO BE THE BARE INDUSTRY CONSENSUS ON THE "PROCEDURAL" GENERAL REQUIREMENTS FOR THIS SUBJECT.

- I. **Trade Union Jurisdictions:** The Contractor shall maintain, and require subcontractors to maintain, complete current information on jurisdictional matters, regulations and pending actions, as applicable to construction activities. The manner in which Contract Documents have been organized and subdivided is not intended to be indicative of trade union or jurisdictional agreements.
 1. Discuss new developments at project meetings at the earliest feasible dates. Record relevant information and actions agreed upon.
 2. Assign and subcontract construction activities, and employ tradesmen and laborers in a manner that will not unduly risk jurisdictional disputes that could result in conflicts, delays, claims and losses.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01097

SECTION 01098 - CODES, REGULATIONS AND STANDARDS - ASBESTOS ABATEMENT

THIS SECTION USES THE TERM DESIGNER. CHANGE THIS TERM AS NECESSARY TO MATCH THE ACTUAL TERM USED TO IDENTIFY THE DESIGN PROFESSIONAL AS DEFINED IN THE GENERAL AND SUPPLEMENTARY CONDITIONS.

THE CONTRACTOR IS REQUIRED BY THE GENERAL CONDITIONS TO COMPLY WITH ALL APPLICABLE LAWS AND REGULATIONS WHETHER FEDERAL STATE OR LOCAL. MATERIAL IN THIS SECTION AMPLIFIES THE REQUIREMENTS OF THE GENERAL CONDITIONS. THESE REQUIREMENTS COULD BE MADE A SUPPLEMENTARY CONDITION RATHER THAN BEING INCLUDED HERE IN A SPECIFICATION SECTION. INCLUDING THESE AS A SUPPLEMENTARY CONDITION THAT DIRECTLY MODIFIES THE GENERAL CONDITIONS, RATHER THAN HERE IN THE SPECIFICATIONS WOULD REDUCE THE POSSIBILITY OF CONFLICTING REQUIREMENTS. IF THIS SECTION IS RETAINED, GREAT CARE SHOULD BE USED TO INSURE THAT ALL APPLICABLE REGULATIONS ARE CITED AND THAT THERE ARE NO CONFLICTS BETWEEN REGULATIONS, SPECIFICATION REQUIREMENTS AND WITH THE GENERAL CONDITIONS.

LAWS AND REGULATIONS CHANGE FREQUENTLY AND ITEMS MENTIONED IN THIS SECTION MIGHT BECOME OBSOLETE IN A SHORT TIME. SIMPLY LISTING IN THE SPECIFICATIONS THOSE LAWS AND REGULATIONS THAT ARE KNOWN TO THE DESIGNER IS NO GUARANTEE THAT THERE ARE NOT OTHER LAWS OR REGULATIONS THAT ALSO APPLY THAT MAY NOT BE KNOWN, AND THAT MAY BE MORE STRINGENT THAN THOSE MENTIONED.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section sets forth governmental regulations which are included and incorporated herein by reference and made a part of the specification. This section also sets forth those notices and permits which are known to the Owner and which either must be applied for and received, or which must be given to governmental agencies before start of work.
 - 1. Requirements include adherence to work practices and procedures set forth in applicable codes, regulations and standards.
 - 2. Requirements include obtaining permits, licenses, inspections, releases and similar documentation, as well as payments, statements and similar requirements associated with codes, regulations, and standards.

1.3 CODES, REGULATIONS AND STANDARDS

- A. **General Applicability of Codes, Regulations and Standards:** Except to the extent that more explicit or more stringent requirements are written directly into the Contract Documents, all applicable codes and regulations have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the Contract Documents, or as if published copies are bound herewith.

- B. Contractor Responsibility:** The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations. The Contractor shall hold the Owner and Designer harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of the contractor, the contractor's employees, or subcontractors.

ALWAYS INCLUDE THE FOLLOWING SECTION ON FEDERAL REGULATIONS.

- C. Federal Requirements:** which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:
1. **OSHA:** U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA), including but not limited to:
 - a. Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite;
Final Rules Title 29, Part 1910, Section 1001 of the Code of Federal Regulations
Final Rules Title 29, Part 1926, Section 1101 of the Code of Federal Regulations
 - b. Respiratory Protection
Title 29, Part 1910, Section 134 of the Code of Federal Regulations
Title 29, Part 1926, Section 103 of the Code of Federal Regulations
 - c. Personal Protective Equipment for General Industry
Title 29, Part 1910, Section 132 of the Code of Federal Regulations
Title 29, Part 1926, Sections 95 - 107 of the Code of Federal Regulations
 - d. Access to Employee Exposure and Medical Records
Title 29, Part 1926, Section 33 of the Code of Federal Regulations
 - e. Hazard Communication
Title 29, Part 1926, Section 59 of the Code of Federal Regulations
 - f. Specifications for Accident Prevention Signs and Tags
Title 29, Part 1910, Section 145 of the Code of Federal Regulations
 - g. Permit Required Confined Space
Title 29, Part 1910, Section 146 of the Code of Federal Regulations
 - h. Construction Industry
Title 29, Part 1910, Section 1001 of the Code of Federal Regulations
Title 29, Part 1926, Section 1101 of the Code of Federal Regulations

- i. Construction Industry - General Duty Standards
Title 29, Part 1926, Sections 20 through 35 of the Code of Federal Regulations

THE SHIPYARD STANDARD APPLIES TO ALL WORK, INCLUDING WORK ON BUILDINGS, IN A SHIPYARD OR ON A SHIP. RETAIN THE PARAGRAPH BELOW AS APPLICABLE.

- j. Shipyard Industry
Title 29 Part 1915 Section 1001 of the Code of Federal Regulations

2. DOT: U. S. Department of Transportation, including but not limited to:

- a. Hazardous Substances
Title 49, Part 171 and 172 of the Code of Federal Regulations
- b. Hazardous Material Regulations
General Awareness and Training Requirements for Handlers, Loaders and Drivers
Title 49, Parts 171-180 of the Code of Federal Regulations
- c. Hazardous Material Regulations
Editorial and Technical Revisions
Title 49, Parts 171-180 of the Code of Federal Regulations

3. EPA: U. S. Environmental Protection Agency (EPA), including but not limited to:

DELETE THE FOLLOWING UNLESS THE WORK IS FOR A UNIT OF LOCAL GOVERNMENT. THE FOLLOWING REGULATION APPLIES ONLY TO EMPLOYEES OF A UNIT OF LOCAL GOVERNMENT INVOLVED IN ASBESTOS ABATEMENT WORK.

- a. Asbestos Abatement Projects; Worker Protection Rule
Title 40 Part 763, Sub-part G of the Code of Federal Regulations

THE COMPLETE AHERA REGULATION APPLIES ONLY TO SCHOOLS, BUT SOME PARTS (ASBESTOS MAP 40 CFR PART 763, APPENDIX C TO SUBPART E) NOW APPLY TO PUBLIC BUILDINGS AND COMMERCIAL BUILDINGS. AHERA CAN BE USED AS A STANDARD OF CARE FOR OTHER STRUCTURES. IF THE FOLLOWING IS RETAINED THE REQUIREMENTS OF THE AHERA REGULATION WILL APPLY TO THE CONTRACT. IF THIS IS DONE, FOR A NON-AHERA PROJECT, THE AHERA REGULATIONS SHOULD BE REVIEWED TO DETERMINE IF ANY EXCEPTIONS SHOULD BE MADE.

- b. Asbestos Hazard Emergency Response Act (AHERA) Regulation
Title 40, Part 763, Sub-part E of the Code of Federal Regulations

THE ABOVE CITATION INCLUDES THE CITATION BELOW. HOWEVER, THE TRAINING REQUIREMENTS AND BALANCE OF THE AHERA REGULATION WERE PUBLISHED IN DIFFERENT EDITIONS OF THE FEDERAL REGISTER. USING BOTH CITATIONS WILL AVOID CONFUSION IF THE FEDERAL REGISTER IS USED AS THE SOURCE OF THE REGULATION.

INCLUDE THE FOLLOWING FOR ALL PUBLIC AND COMMERCIAL BUILDINGS AS WELL AS FOR SCHOOLS. THE REQUIREMENTS OF THIS PORTIONS OF THE AHERA REGULATION (EPA MODEL ACCREDITATION PLAN) WERE EXTENDED TO ALL PUBLIC AND COMMERCIAL BUILDINGS BY THE ASBESTOS IN SCHOOLS HAZARD ABATEMENT REAUTHORIZATION ACT (ASHARA).

- c. EPA Model Accreditation Plan - Asbestos Containing Materials Final Rule & Notice
Title 40, Part 763, Sub-part E, Appendix C of the Code of Federal Regulations
- d. National Emission Standard for Hazardous Air Pollutants (NESHAP)
National Emission Standard for Asbestos
Title 40, Part 61, Sub-part A, and Sub-part M (Revised Sub-part B) of the Code of Federal Regulations

ALWAYS INCLUDE THE FOLLOWING SECTION ON STATE DOCUMENTS.

- D. State Requirements:** which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:

INSERT REFERENCE TO APPLICABLE STATE REGULATIONS.

LAWS AND REGULATIONS INVOLVING ALL ASPECTS OF ASBESTOS ABATEMENT WORK ARE AN EXTREMELY ACTIVE AREA AMONG STATES. MOST STATES HAVE ENACTED SOME LEVEL OF LAWS AND/OR REGULATIONS. BEFORE EDITING THIS SECTION, THE RECENT REGULATORY ACTIVITIES OF THE STATE THE PROJECT IS IN SHOULD BE RESEARCHED. STATE AGENCIES TYPICALLY INVOLVED INCLUDE:
DEPARTMENT OF ENVIRONMENTAL PROTECTION
HEALTH DEPARTMENT
EDUCATION DEPARTMENT
LABOR DEPARTMENT
DEPARTMENT OF TRANSPORTATION
BUILDING DEPARTMENT
DEPARTMENT OF SANITATION
OCCUPATIONAL SAFETY AND HEALTH

THERE ARE SEVERAL INFORMATION SERVICES THAT HAVE GATHERED OR MAINTAIN UPDATED INFORMATION ON FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS. THESE SERVICES INCLUDE ONLINE SERVICES, REGULATIONS ON DISK AND BINDER UPDATE SERVICES.

DELETE THE FOLLOWING TWO PARAGRAPHS IF THERE ARE NO LOCAL REGULATIONS WHICH APPLY TO THE ASBESTOS ABATEMENT WORK.

- E. Local Requirements:** which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:

INSERT REFERENCE TO APPLICABLE LOCAL REGULATIONS.

DELETE EITHER ABOVE OR BELOW. ABOVE ACCOMPANIED BY A LISTING OF APPLICABLE REGULATIONS IS PREFERABLE. BELOW IS A CATCH ALL APPROACH.

Abide by all local requirements which govern asbestos abatement work or hauling and disposal of asbestos waste materials.

1.4 NOTICES:

A. U.S. ENVIRONMENTAL PROTECTION AGENCY

NOTIFICATION TO THE US EPA IS MANDATED BY THE NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHP) ASBESTOS REGULATIONS (40 CFR 61, SUBPART M) FOR ANY PROJECT WHICH INVOLVES THE REMOVAL OF ASBESTOS-CONTAINING MATERIALS (ACM). NOTIFICATION OF ENCAPSULATION PROJECTS IS NOT REQUIRED, BUT IS NOT DISCOURAGED BY EPA.

IN ENFORCING "NESHP" NOTIFICATION VIOLATIONS THE EPA IS CURRENTLY LEVYING FINES AGAINST BOTH THE OWNER AND THE CONTRACTOR.

REFER TO NESHP ASBESTOS REGULATIONS 40 CFR 61, SUBPART M FOR SPECIFICS ON LENGTH OF NOTICE.

UNLESS STATE/LOCAL NOTIFICATION THRESHOLDS ARE MORE STRINGENT, DELETE THE NOTIFICATION REQUIREMENTS FOR RENOVATIONS INVOLVING LESS THAN 80 LINEAR METERS (260 LINEAR FEET) OF PIPE INSULATION, OR 15 SQUARE METERS (160 SQUARE FEET), OR 1 CUBIC METER (35 CUBIC FEET) IF THE LENGTH AND WIDTH COULD NOT BE MEASURED. ALL DEMOLITION PROJECTS, REGARDLESS OF ASBESTOS PRESENCE, ABSENCE OR QUANTITY, REQUIRE A NESHP NOTIFICATION AND 10 WORKING DAY WAITING PERIOD

IT IS PRUDENT FOR THE OWNER OR DESIGNER TO VERIFY WITH THE EPA NESHP COORDINATOR THAT THE REQUIRED NOTIFICATION HAS BEEN RECEIVED AND IS ACCEPTABLE. EVIDENCE OF TRANSMISSION OF A NOTIFICATION FROM THE CONTRACTOR DOES NOT GUARANTEE THAT THE EPA HAS ACCEPTED THE NOTIFICATION.

1. Postmark or Deliver Written Notification as required by USEPA National Emission Standards for Hazardous Air Pollutants (NESHP) Asbestos Regulations (40 CFR 61, Subpart M) to the regional Asbestos NESHP Contact at least 10 working days prior to beginning any work on asbestos-containing materials (ACM). Send notification to the following address:

SELECT THE CORRECT ADDRESS FROM THE FOLLOWING LIST. SOME STATE AND LOCAL JURISDICTIONS HAVE THEIR OWN LOCAL NESHP COORDINATOR AND REQUIRE THE NOTIFICATION TO BE SENT THERE AND NOT TO THE REGIONAL ASBESTOS NESHP CONTACT AS LISTED. EDIT THE ADDRESS ACCORDINGLY .

- a. **REGION 1:**
Asbestos NESHP Contact
Air Management Division
USEPA
JFK Federal Building

Boston, MA 02203
(617)565-3260

- b. REGION 2:
Asbestos NESHAP Contact
Air & Waste Management Division
USEPA
26 Federal Plaza
New York, NY 10007
(212)264-9627

- c. REGION 3
Asbestos NESHAP Contact
Air Management Division
USEPA
841 Chestnut Street
Philadelphia, PA 19107
(215) 597-6550

- d. REGION 4
Asbestos NESHAP Contact
Air, Pesticide & Toxic Management
USEPA
345 Courtland Street N.E.
Atlanta, GA 30365
(404) 347-5014

- e. REGION 5
Asbestos NESHAP Contact
Air & Radiation Division
USEPA
230 S. Dearborn Street
Chicago, Illinois 60604
(312) 886-6793

- f. REGION 6
Asbestos NESHAP Contact
Air, Pesticides & Toxics Division
USEPA
1445 Ross Avenue, Suite 1200
Dallas, TX 75202
(214) 655-7223

- g. REGION 7
Asbestos NESHAP Contact
Air Management Division
USEPA
726 Minnesota Avenue
Kansas City, KS 66101
(913) 551-7020

- h. REGION 8
Asbestos NESHAP Contact
Air & Waste Management Division
USEPA
One Denver Place
999 18th Street, Suite 500
Denver, CO 80202-2405
(303) 293-7685

- i. REGION 9
Asbestos NESHAP Contact
Air Management Division
USEPA
215 Fremont Street
San Francisco, CA 94105
(415) 556-5474

- j. REGION 10
Asbestos NESHAP Contact
Air & Toxics Management Division
USEPA
1200 Sixth Avenue
Seattle, WA 98101
(206) 442-1757

DELETE THE FOLLOWING IS A DIFFERENT FORM IS TO BE USED.

- 2. There is a copy of the NESHAP form at the end of this section.

- 3. Notification: Include the following information in the notification sent to the NESHAP contact:
 - a. Indication whether the notification is the original or revised notification
 - b. Name, address, and telephone number of owner or operator.
 - c. Name, address, and telephone number of contractor.
 - d. Type of Operation (demolition or renovation).

- e. Description of the facility or affected part of the facility being demolished or renovated, including the size (square feet [square meters], number of floors), age, present and prior use of the facility.
- f. Estimate of the approximate amount of RACM to be removed from the facility in terms of linear meters [linear feet] of pipe, and surface area in square meters [square feet] of other facility components. Also estimate the approximate amount of Category I and Category II nonfriable ACM in the affected part of the facility that will not be removed before demolition.
- g. For facilities in which the amount of friable asbestos materials less than 80 linear meters (260 linear feet) on pipes and less than 15 square meters (160 square feet) or 1 cubic meter (35 cubic feet) if the length and width could not be measured. On other facility components, explain techniques of estimation.
- h. Location and street address (including building number or name and floor or room number, if appropriate), city county, and state, of the facility being demolished or renovated.
- i. Scheduled starting and completion dates of asbestos removal work (or any other activity, such as site preparation that would break up, dislodge, or similarly disturb asbestos material) in a demolition or renovation; planned renovation operations involving individual nonscheduled operations shall only include the beginning and ending dates of the report period as described in paragraph (a)(4)(iii) of 40 CFR 61.145.
- j. Scheduled starting and completion dates of demolition or renovation.
- k. Nature of planned demolition or renovation and method(s) to be used, including demolition or renovation techniques to be used and description of affected facility components.
- l. Procedures to be used to comply with the requirements of USEPA National Emission Standards for Hazardous Air Pollutants (NESHAP) Asbestos Regulations (40 CFR 61 Subpart M).
- m. Name and location of the waste disposal site where the asbestos containing waste material will be deposited.
- n. A certification that at least one person trained as required by paragraph (c)(8) of 40 CFR 61.145 will supervise the stripping and removal described by this notification.

DELETE THE FOLLOWING IF NOT APPLICABLE

- o. For facilities being demolished under an order of a State or local governmental agency, issued because the facility is structurally unsound and in danger of imminent collapse, the name, title, and authority of the State or local governmental representative who has ordered the demolition. A copy of the order shall be attached to the notification.

DELETE THE FOLLOWING IF NOT APPLICABLE

- p. For emergency renovations described in paragraph (a)(4)(iv) of 40 CFR 61.145, the date and hour that the emergency occurred, a description of the sudden, unexpected

- event, and an explanation of how the event caused an unsafe condition, or would cause equipment damage or an unreasonable financial burden.
- q. Description of procedures to be followed in the event that the unexpected RACM is found or Category II nonfriable ACM becomes crumbled, pulverized, or reduced to powder.
 - r. Name, address, and telephone number of the waste transporter.

THE FOLLOWING SHOULD BE DELETED, IF ALTERNATIVE WORK PROCEDURES ARE NOT GOING TO BE CONSIDERED.

B. OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION

- 1. Send a copy of evaluation and certification of alternative work procedures to the national office of OSHA, Office of Technical Support, Room N3653, 200 Constitution Avenue, NW, Washington, DC 20210 before work which involves the removal of more than 25 linear or 10 square feet (7.5 linear meters or 3 square meters) of thermal system insulation or surfacing material is begun using an alternative method.

THE FOLLOWING SHOULD BE EDITED FOR SPECIFIC STATE REQUIREMENTS. VIRTUALLY EVERY STATE, AND A NUMBER OF CITIES AND COUNTIES HAVE DUPLICATE OR PREFERENTIAL NOTIFICATION REQUIREMENTS. THESE STATE NOTIFICATIONS OFTEN PROVIDE DIFFERENT QUANTITY THRESHOLDS AND WAITING TIMES REQUIRED FOR NOTIFICATIONS

C. STATE AND LOCAL AGENCIES:

- 1. Send written notification as required by state and local regulations prior to beginning any work on ACM.

1.5 PERMITS:

FOLLOWING IS AN EXAMPLE OF A TYPICAL PERMIT REQUIREMENT. REVISE AS NECESSARY TO BE IN ACCORD WITH STATE AND LOCAL REQUIREMENTS.

- A. Permit: All asbestos containing waste is to be transported by an entity maintaining a current "Industrial waste hauler permit" specifically for ACM, as required for transporting of waste ACM to a disposal site.
- B. Contractor is responsible for obtaining any demolition, building, renovation or other permits, and for paying application fees, if any, where required by State or Local jurisdictions.

1.6 LICENSES:

DELETE THE FOLLOWING WHERE NO LICENSES ARE REQUIRED BY STATE OR LOCAL REGULATIONS.

- A. Licenses: Maintain current licenses as required by applicable state or local jurisdictions for the removal, transporting, disposal or other regulated activity relative to the work of this contract.

1.7 POSTING AND FILING OF REGULATIONS

- A. **Posting and Filing of Regulations:** Post all notices required by applicable federal, state and local regulations. Maintain two (2) copies of applicable federal, state and local regulations and standard. Maintain one copy of each at job site. Keep on file in Contractor's office one copy of each.

1.8 SUBMITTALS:

- A. **Before Start of Work:** Submit the following to the Designer for review. No work shall begin until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use or final-but-restricted use.
 - 1. **Permits, Licenses, and Certificates:** For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work including:
 - a. **State and Local Regulations:** Submit copies of codes and regulations applicable to the work.
 - 2. **Notices:** Submit notices required by federal, state and local regulations together with proof of timely transmittal to agency requiring the notice.
 - 3. **Permits:** Submit copies of current valid permits required by state and local regulations.
 - 4. **Licenses:** Submit copies of all State and local licenses and permits necessary to carry out the work of this contract.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION - 01098

for NESHPA Notification form, see file 01098SFM.

NOTIFICATION OF DEMOLITION AND RENOVATION

OPERATOR PROJECT #	POSTMARK	DATE RECEIVED	NOTIFICATION #		
I. TYPE OF NOTIFICATION (O-Original R-Revised C-Canceled):					
II. FACILITY INFORMATION (identify owner, removal contractor, and other operator)					
OWNER NAME:					
ADDRESS:					
CITY:		STATE:	ZIP:		
CONTACT:			TEL:		
REMOVAL CONTRACTOR:					
ADDRESS:					
CITY:		STATE:	ZIP:		
CONTACT:			TEL:		
OTHER OPERATOR:					
ADDRESS:					
CITY:		STATE:	ZIP:		
CONTACT:			TEL:		
III. TYPE OF OPERATION (D-Demo O - Ordered Demo R - Renovation E - Emergency Renovation):					
IV. IS ASBESTOS PRESENT? (Yes/No)					
V. FACILITY DESCRIPTION (Include building name, number and floor or room number)					
BLDG NAME:					
ADDRESS:					
CITY:		STATE:	ZIP:		
SITE LOCATION:					
BUILDING SIZE:		# OF FLOORS:	AGE IN YEARS:		
PRESENT USE:			PRIOR USE:		
VI. PROCEDURE, INCLUDING ANALYTICAL METHOD, IF APPROPRIATE, USED TO DETECT THE PRESENCE OF ASBESTOS MATERIAL:					
VII. APPROXIMATE AMOUNT OF ASBESTOS, INCLUDING: 1. REGULATED ACM TO BE REMOVED 2. CATEGORY I ACM NOT REMOVED 3. CATEGORY II ACM NOT REMOVED	RACM TO BE REMOVED	NONFRIABLE ASBESTOS MATERIAL NOT TO BE REMOVED		INDICATE UNIT OF MEASUREMENT BELOW	
		CAT I	CAT II	UNIT	
PIPE				Ln Ft:	Ln m:
SURFACE AREA				Sq Ft:	Sq m:
VOL RACM OFF FACILITY COMPONENT				Cu Ft:	Cu m:
VIII. SCHEDULED DATES ASBESTOS REMOVAL (MM/DD/YY) Start:			Complete:		
IX. SCHEDULED DATES DEMO/RENOVATION (MM/DD/YY) Start:			Complete:		

continued on page two

X. DESCRIPTION OF PLANNED DEMOLITION OR RENOVATION WORK, AND METHOD(S) TO BE USED:		
XI. DESCRIPTION OF WORK PRACTICES AND ENGINEERING CONTROLS TO BE USED TO PREVENT EMISSIONS OF ASBESTOS AT THE DEMOLITION AND RENOVATION SITE:		
XII. WASTE TRANSPORTER #1		
ADDRESS:		
CITY:	STATE:	ZIP:
CONTACT:		TEL:
WASTE TRANSPORTER #2		
ADDRESS:		
CITY:	STATE:	ZIP:
CONTACT:		TEL:
XIII. WASTE DISPOSAL SITE		
NAME:		
LOCATION:		
CITY:	STATE:	ZIP:
TELEPHONE:		
XIV. IF DEMOLITION ORDERED BY A GOVERNMENT AGENCY, PLEASE IDENTIFY THE AGENCY BELOW:		
NAME:		TITLE:
AUTHORITY:		
CITY:	STATE:	ZIP:
DATE OF ORDER (MM/DD/YY)		DATE ORDERED TO BEGIN (MM/DD/YY)
XV. FOR EMERGENCY RENOVATIONS		
Date and Hour of Emergency (MM/DD/YY):		
Description of the Sudden, Unexpected Event:		
Explanation of how the event caused unsafe conditions or would cause equipment damage or an unreasonable financial burden:		
XVI. DESCRIPTION OF PROCEDURES TO BE FOLLOWED IN THE EVENT THAT UNEXPECTED ASBESTOS IS FOUND OR PREVIOUSLY NONFRIABLE ASBESTOS MATERIAL BECOMES CRUMBLED, PULVERIZED, OR REDUCED TO POWDER.		
XVII. I CERTIFY THAT AN INDIVIDUAL TRAINED IN THE PROVISIONS OF THIS REGULATION (40 CFR PART 61, SUBPART M) WILL BE ON-SITE DURING THE DEMOLITION OR RENOVATION AND EVIDENCE THAT THE REQUIRED TRAINING HAS BEEN ACCOMPLISHED BY THIS PERSON WILL BE AVAILABLE FOR INSPECTION DURING NORMAL BUSINESS HOURS. (Required 1 year after promulgation)		
_____		_____
(Signature of Owner/Operator)		(Date)
XVIII. I CERTIFY THAT THE ABOVE INFORMATION IS CORRECT.		
_____		_____
(Signature of Owner/Operator)		(Date)

SECTION 01301 - SUBMITTALS - ASBESTOS ABATEMENT

SUBMITTAL CHECKLIST

The following is a listing of the submittals required by each section. Determine what submittals are actually desired and edit the individual sections as necessary to eliminate unnecessary submittal requirements.

01013 Summary of Work - Asbestos Abatement

Before Start of Work:

Plan of Action

Pre-construction Inspection

01028 Application for Payment - Asbestos Abatement

Before Start of Work:

Schedule of Values

Periodically During Work:

Refer to section for specific requirements for Payment Requests

01043 Project Coordination - Asbestos Abatement

Before Start of Work:

Contractors Construction Schedule

Contingency Plans

Telephone Numbers

Notifications sent to other entities at the work site.

Notifications sent to emergency service agencies.

Resume: of general superintendent.

Accreditation: Certificate of accreditation of general superintendent

Staff Names:

Periodically During Work:

Daily Logs

Event Reports

Accident Reports

Discovered Condition Reports

01046 Cutting & Patching - Asbestos-Containing Materials

Before Start of Work:

Product Data on Tools

01098 Codes, Regulations and Standards - Asbestos Abatement

Before Start of Work:

State Regulations

Local Regulations

Licenses

Notifications

Permits

01301 Submittals

Before Start of Work:

Submittal Schedule

Periodically During Work:

Progress photographs

Record Documents

01503 Temporary Facilities - Asbestos Abatement

Before Start of Work:

Scaffolding

Hot water heater

Decontamination Unit Sub-panel

Ground Fault Circuit Interrupters (GFCI)

Lamps and Light Fixtures

Temporary Heating Units

Temporary Cooling Units

Self Contained Toilet Units: Product Data, Sub-contractor

First Aid Supplies

Fire Extinguishers: product data, location schedule

01513 Temporary Pressure Differential & Air Circulation System

Before Start of Work:

Pressure Differential System Design

HEPA Filtered Fan Units: Product data

Monitoring Equipment: Product data

Auxiliary Generator: Product data.

Power Switch: Product data.

Auxiliary Power System: Shop Drawing

Periodically During Work:

Pressure Differential Monitoring Results

01526 Temporary Enclosures

Before Start of Work:

Strippable Coatings: Product data.

Strippable Coatings: Test report on ASTM E84 test

Strippable Coatings: Manufacturer's installation instructions. Strippable Coatings: Material

Safety Data Sheet

Spray Cement: Product data.

Spray Cement: Manufacturer's installation instructions.

Spray Cement: Material Safety Data Sheet.

Sheet Plastic: Test reports on NFPA 701 test.

Signs: Samples

Caulking: Product Data

Caulking: Material Safety Data Sheet

Periodically During Work:

Inspection report prior to applying strippable coating.

Photograph of existing damage prior to applying coatings.

Test Patches of strippable coating.

01527 Regulated Areas

Before Start of Work:

HEPA Filtered Vacuum Cleaners: product data.

Signs: samples.

Warning Tape: samples.

01528 Entry Into Controlled Areas

Before Start of Work:

Historic Airborne Fiber Data

01529 Mini Enclosures and Glovebags

Before Start of Work:

Surfactant: product data.

Removal Encapsulant: product data.

NESHAP Certification on surfactant or removal encapsulant.

Material Safety Data Sheet for each surfactant and encapsulant

Historic Airborne Fiber Data

Spray Cement: Product data.

Spray Cement: Manufacturer's installation instructions.

Spray Cement: Material Safety Data Sheet.

Sheet Plastic: test reports on NFPA 701 test.

Glovebags: product data.

Signs: samples.

Mini-enclosure: shop drawing.

01560 Worker Protection - Asbestos Abatement

Before Start of Work:

AHERA Accreditation: for each worker.

State and Local License: for each worker.

Historic Airborne Fiber Data.

Certificate Worker Acknowledgment: for each worker.

Training Program: course outline.

Report from Medical Examination: of each worker.

Notarized Certifications.

Periodically During Work:

Personnel Air Samples for Analysis

Area Air Samples for Analysis

01561 Worker Protection - Repair & Maintenance

Before Start of Work:

ASHERA Accreditation: for each worker.
State and Local License: for each workers.
Historic Airborne Fiber Data.
Certificate Worker Acknowledgment: for each worker.
Training Program: course outline.
Report from Medical Examination: of each worker.
Notarized Certifications.

Periodically During Work:

Personnel Air Samples for Analysis
Area Air Samples for Analysis

01562 Respiratory Protection

Before Start of Work:

Product Data.
NIOSH and MSHA Certifications.
Type "C": System Diagram.
Type "C": Operating Instruction.
Respiratory Protection Program: written manual.
Respiratory Protection Program: form at end of section.
Historic Airborne Fiber Data.
Resume information.

01563 Decontamination Units

Before Start of Work:

Personnel Decontamination Unit: shop drawing.
Equipment Decontamination Unit: shop drawing.
Shower Pan: shop drawing.
Shower Walls: product data.
Shower Head and Controls: product data.
Filters: product data.
Filters: shop drawing.
Hose Bib: product data.
Wash Station Shower Stall: product data.
Wash Station Shower Stall: shop drawing.
Elastomeric membrane: product data.
Lumber: product data on fire resistance treatment.
Sump Pump: product data.
Signs: samples.

01601 Materials and Equipment - Asbestos Abatement

Before Start of Work:

Product List Schedule

01632 Substitutions - Asbestos Abatement

Before Start of Work:

Refer to section.

Periodically During Work:

Refer to section

01701 Project Closeout - Asbestos Abatement

Periodically During Work:

Refer to section

01711 Project Decontamination

Periodically During Work:

Fire Test on Lock Back Encapsulants used.

02061 Building Component Demolition - Asbestos Abatement

Before Start of Work:

Surfactant: product data.

Removal Encapsulant: product data.

NESHAP Certification: on surfactant or removal encapsulant.

Material Safety Data Sheet: for each surfactant and encapsulant

Copy of pre-demolition / renovation notification sent to the Regional EPA Office.

02062 Non-Asbestos Demolition

Before Start of Work:

Schedule

Periodically During Work:

Reports of Inspection for Existing Damage

Photographs of Existing Damage

02081 Removal of Asbestos-Containing Materials

Before Start of Work:

Surfactant: product data.

Removal Encapsulant: product data.

NESHAP Certification: on surfactant or removal encapsulant.

Material Safety Data Sheet: for each surfactant and encapsulant

02083 Disturbance of ACM During O&M Work

Before Start of Work:

Documentation on Initial and Negative Exposure Assessments

02084 Disposal of Regulated Asbestos-Containing Material

Before Start of Work:

- Waste Hauler State License
- Waste Hauler Local License
- Name and address of landfill.
- Landfill contact person and telephone number.
- Name and address of processor.
- Processor contact person and telephone number.
- Product data on process to be used.
- EPA letter on process as a NESHAP alternative.
- Process parameters or operating conditions.
- Chain of Custody form
- Waste Manifest Form.
- Disposal Bag: samples.
- Label Samples.

Periodically During Work:

- On a weekly basis: copies of manifests and disposal site receipts.

02085 Resilient Floor Covering Manufacturers' Recommended Work Practices

Before Start of Work:

- Documentation on Initial and Negative Exposure Assessments

09251 Gypsum Drywall - Asbestos Enclosure

Before Start of Work:

- Product Data

09805 Encapsulation of Asbestos-Containing Materials

Before Start of Work:

- Product Data.
- Installation Instructions.
- Performance Warranty
- Certification.
- Material Safety Data Sheet.

Periodically During Work:

- Notification of unsatisfactory substrate.

15254 Repair of Insulation and Lagging

Before Start of Work:

- Mineral Wool Insulating Cement: product data.
- Waterproof Cement: product data.
- Nonwoven Fibrous Glass Mat: product data.
- Open Weave Glass Fiber Mat: product data.
- Plastic Jackets: product data.
- Labels: samples.

END OF SUBMITTAL CHECKLIST

SECTION 01301 - SUBMITTALS - ASBESTOS ABATEMENT

BASED ON SECTION 01300 "SUBMITTALS" FROM MASTERSPEC® TEXT COPYRIGHTED IN 1994 BY AIA, THE AMERICAN INSTITUTE OF ARCHITECTS.

NORMALLY THE CONTRACTOR'S CONSTRUCTION SCHEDULE WOULD BE IN THIS SECTION. IN THE MODEL GUIDE SPECIFICATION, THE CONTRACTOR'S CONSTRUCTION SCHEDULE HAS BEEN MOVED TO SECTION 01043 COORDINATION, MAKING THIS SECTION A PURELY ADMINISTRATIVE ONE.

THIS SECTION HAS BEEN COMPLETELY REVISED TO REFLECT THE CHANGES OF THE REVISED CORRESPONDING MASTERSPEC SECTION.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following:

REVISE THE LIST BELOW TO INCLUDE OTHER REQUIRED SUBMITTALS.

- 1. Submittal schedule.
 - 2. Daily construction reports.
 - 3. Shop Drawings.
 - 4. Product Data.
 - 5. Samples.
 - 6. Quality Assurance Submittals
- B. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:

THE LIST BELOW INCLUDES ADMINISTRATIVE SUBMITTALS INCLUDED ELSEWHERE IN CONTRACT DOCUMENTS. ADD ITEMS IF NECESSARY.

- 1. Permits
- 2. Applications for payment
- 3. Performance and payment bonds
- 4. Insurance certificates

5. List of Subcontractors

THE PARAGRAPHS BELOW INCLUDE SUBMITTALS USUALLY SPECIFIED IN OTHER SECTIONS. REVISE TO SATISFY PROJECT REQUIREMENTS.

C. RELATED SECTIONS

- 1. The following Sections contain requirements that relate to this Section:

SUBPARAGRAPHS BELOW INCLUDE SUBMITTALS USUALLY SPECIFIED IN OTHER SECTIONS. REVISE TO SUIT PROJECT.

- a. Division 1 Section "Applications for Payment - Asbestos Abatement" specifies requirements for submittal of the Schedule of Values.

REVISE SUBPARAGRAPH BELOW TO SUIT PROJECT IF SUBMITTAL OF COORDINATION DRAWINGS IS INCLUDED UNDER THIS SECTION.

- b. Division 1 Section "Coordination" specifies requirements governing submittal and distribution of meeting and conference minutes.
c. Division 1 Section "Project Closeout-Asbestos Abatement" specifies requirements for submittal of Project Record Documents and warranties at project closeout.

1.3 SUBMITTAL PROCEDURES

COORDINATE REQUIREMENTS IN THIS ARTICLE WITH "SUBMITTAL SCHEDULE" ARTICLE. REVISE REQUIREMENTS TO SUIT PROJECT. IF A SUBMITTAL REVIEW SEQUENCE POLICY GOVERNS, REVISE THIS ARTICLE TO COMPLY WITH REQUIREMENTS.

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

RETAIN SUBPARAGRAPH BELOW WHERE ONE SUBMITTAL HAS AN IMPACT ON ANOTHER.

- 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
a. The Designer reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

REVISE THE PARAGRAPHS BELOW TO SATISFY PROJECT REQUIREMENTS. DELETE IF GENERAL CONDITIONS ARE ADEQUATE.

- B. Processing:** To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.

MODIFY PROCESSING TIME TO SUIT PROJECT.

1. Allow 2 weeks for initial review. Allow additional time if the Designer must delay processing to permit coordination with subsequent submittals.
2. If an intermediate submittal is necessary, process the same as the initial submittal.
3. Allow 2 weeks for reprocessing each submittal.
4. No extension of Contract Time will be authorized because of failure to transmit submittals to the Designer sufficiently in advance of the Work to permit processing.

- C. Submittal Preparation:** Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

IF DESIRED, REVISE THE SIZE OF THE SPACE INDICATED BELOW.

1. Provide a space approximately 4 by 5 inches (100 by 125 mm) on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
2. Include the following information on the label for processing and recording action taken.

MODIFY LIST BELOW TO SUIT PROJECT.

- a. Project name.
- b. Date.
- c. Name and address of the Designer.
- d. Name and address of the Contractor.
- e. Name and address of the subcontractor.
- f. Name and address of the supplier.
- g. Name of the manufacturer.
- h. Number and title of appropriate Specification Section.
- i. Drawing number and detail references, as appropriate.

EXPAND OR OTHERWISE MODIFY PARAGRAPH BELOW TO SUIT PROJECT.

3. Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

EXPAND OR OTHERWISE MODIFY THE NEXT PARAGRAPH TO SUIT PROJECT REQUIREMENTS.

- D. **Submittal Transmittal:** Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Designer using a transmittal form. The Designer will not accept submittals received from sources other than the Contractor.

RETAIN SUBPARAGRAPH BELOW WITH ANY OF THE OPTIONAL TRANSMITTAL FORMS BELOW.

- 1. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

IF TRANSMITTAL FORMS USED BY CONTRACTORS ARE ACCEPTABLE, DELETE BOTH OPTIONS BELOW. OTHERWISE, RETAIN 1 OF 2 FORMS BELOW.

- E. **Transmittal Form:** Use AIA Document G810.

PROVIDE A SAMPLE FORM AT THE END OF THE SECTION IF THIS OPTION IS SELECTED.

- F. **Transmittal Form:** Use the sample form at the end of this Section for transmittal of submittals.

1.4 SUBMITTAL SCHEDULE

RETAIN THIS ARTICLE. THE REQUIREMENT FOR A SUBMITTAL SCHEDULE WAS ADDED TO THE 1987 EDITION OF AIA DOCUMENT A201. COORDINATE WITH "SUBMITTAL PROCEDURES" ARTICLE. REVISE REQUIREMENTS TO SUIT PROJECT. IF A SUBMITTAL REVIEW SEQUENCE POLICY GOVERNS SUBMITTALS, INSERT SPECIFIC REQUIREMENTS..

THE LISTING AT THE END OF THIS SECTION DUPLICATES THE LISTING THAT OCCURS IN EACH SPECIFICATION SECTION. INCLUDING THIS DUPLICATION INCREASES THE RISK OF INCONSISTENT REQUIREMENTS FOR SUBMITTALS. GATHERING ALL SUBMITTAL REQUIREMENTS INTO ONE LOCATION IS CONVENIENT. THE DESIGNER SHOULD REVIEW WITH THEIR ATTORNEY THE LIABILITY IMPLICATIONS OF SUBMITTAL REQUIREMENTS. THIS SECTION COULD BE REVISED TO BECOME A LISTING OF ALL SUBMITTALS, AND THE CORRESPONDING LISTING DELETED FROM INDIVIDUAL SPECIFICATION SECTIONS, OR THE LISTING IN THIS SECTION COULD BE DELETED, OR THE EXISTING LANGUAGE COULD BE LEFT SO THAT THE LISTING IN THIS SECTION IS FOR CONVENIENCE ONLY.

- A. **Listing:** At the end of this section is a listing of the principal submittals required for the work. This listing is not necessarily complete, nor does the listing reflect the significance of each submittal requirement. The listing is included only for the convenience of users of the Contract Documents.

REVISE TIME PERIOD BELOW TO SUIT PROJECT. CONSIDER REQUIRING SUBMITTAL CONCURRENTLY WITH CONTRACTOR'S CONSTRUCTION SCHEDULE.

- B. Submittal Schedule:** After development and acceptance of the Contractor's Construction Schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for submittal of the Contractor's Construction Schedule.

REVISE SUBPARAGRAPH BELOW IF NECESSARY TO SUIT PROJECT.

1. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products as well as the Contractor's Construction Schedule.
2. Prepare the schedule in chronological order. Provide the following information:

IF CIRCUMSTANCES WARRANT, REVISE LIST BELOW. ADD INFORMATION, SUCH AS SCHEDULED DATES FOR PURCHASING AND INSTALLATION, AND THE ACTIVITY OR EVENT NUMBER IF A CPM TYPE CONSTRUCTION SCHEDULE IS USED.

- a. Scheduled date for the first submittal.
 - b. Related Section number.
 - c. Submittal category (Shop Drawings, Product Data, or Samples).
 - d. Name of the subcontractor.
 - e. Description of the part of the Work covered.
 - f. Scheduled date for resubmittal.
 - g. Scheduled date for the Designer's final release or approval.
- C. Distribution:** Following response to the initial submittal, print and distribute copies to the Designer, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.
1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- D. Schedule Updating:** Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.5 SHOP DRAWINGS

DELETE THE THIS ARTICLE IF THERE ARE TO BE NO SHOP DRAWINGS. THERE WILL FREQUENTLY BE NO SHOP DRAWINGS ON ASBESTOS ABATEMENT PROJECTS, PARTICULARLY ON PROJECTS THAT INVOLVE ONLY ASBESTOS REMOVAL.

MODIFY BELOW TO SUIT EACH PROJECT. COMPLY WITH OWNER'S REQUIREMENTS AND OFFICE POLICY.

- A. Submit** newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy

standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.

- B. Shop Drawings** include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings. Include the following information:

AMPLIFY LIST BELOW AS NECESSARY TO SUIT PROJECT.

1. Dimensions.
2. Identification of products and materials included by sheet and detail number.
3. Compliance with specified standards.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.

MODIFY SUBPARAGRAPH BELOW TO ESTABLISH A STANDARD SHEET SIZE AND FORMAT.

- C. Sheet Size:** Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 36 by 48 inches (890 by 1220 mm).

CONSIDER OMITTING THE REQUIREMENT FOR AN INITIAL SUBMITTAL OF SHOP DRAWINGS BELOW.

- D. Initial Submittal:** Submit one correctable, translucent, reproducible print and one blue- or black-line print for the Designer's review. The Designer will return the reproducible print.

USUALLY RETAIN SUBPARAGRAPH ABOVE AND DELETE SUBPARAGRAPH BELOW. RETAIN BELOW ONLY FOR SMALL PROJECTS.

- E. Initial Submittal:** Submit 2 blue- or black-line prints for the Designer's review. The Designer will return one print.

RETAIN SUBPARAGRAPH BELOW WHEN INITIAL SUBMITTAL IS A REPRODUCIBLE PRINT.

- F. Final Submittal:** Submit 3 blue- or black-line prints; submit 5 prints where required for maintenance manuals. The Designer will retain 2 prints and return the remainder.

RETAIN SUBPARAGRAPH BELOW WHEN INITIAL SUBMITTAL IS AN OPAQUE PRINT.

- G. Final Submittal:** Submit 3 blue- or black-line prints and 2 additional prints where required for maintenance manuals, plus the number of prints needed by the Designer for distribution. The Designer will retain 2 prints and return the remainder.

RETAIN SUBPARAGRAPH BELOW WITH EITHER OF THE SUBPARAGRAPHS ABOVE.

1. One of the prints returned shall be marked up and maintained as a "Record Document."
2. Do not use Shop Drawings without an appropriate final stamp indicating action taken.

1.6 PRODUCT DATA

DELETE THE THIS ARTICLE IF THERE ARE TO BE NO PRODUCT DATA SUBMITTALS. THERE WILL FREQUENTLY BE NO PRODUCT DATA SUBMITTALS ON ASBESTOS ABATEMENT PROJECTS, PARTICULARLY ON PROJECTS THAT INVOLVE ONLY ASBESTOS REMOVAL.

MODIFY PARAGRAPHS BELOW TO COMPLY WITH OWNER'S REQUIREMENTS AND OFFICE POLICY.

- A. Collect Product Data into a single submittal.** Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."
1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:

AMPLIFY THE LIST BELOW AS NECESSARY TO SATISFY PROJECT REQUIREMENTS.

- a. Manufacturer's printed recommendations.
 - b. Compliance with recognized trade association standards.
 - c. Compliance with recognized testing agency standards.
 - d. Application of testing agency labels and seals.
 - e. Notation of dimensions verified by field measurement.
 - f. Notation of coordination requirements.
2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

RETAIN THE NEXT PARAGRAPH UNLESS THIS PROCEDURE IS NOT PERMITTED OR ENCOURAGED.

- B. Preliminary Submittal:** Submit a preliminary single-copy of Product Data where selection of options is required.

REVISE THE NEXT PARAGRAPH IF A METHOD OF HANDLING SIMILAR TO THAT FOR SHOP DRAWINGS IS DESIRED.

- C. **Submittals:** Submit 3 copies of each required submittal. The Designer will retain two, and will return the one marked with action taken and corrections or modifications required.
 - 1. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

- D. **Distribution:** Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
 - 1. Do not proceed with installation until a final submittal is in the installer's possession.
 - 2. Do not permit use of unmarked copies of Product Data in connection with construction.

1.7 SAMPLES

DELETE THE THIS ARTICLE IF THERE ARE TO BE NO SAMPLES. THERE WILL FREQUENTLY BE NO SAMPLES ON ASBESTOS ABATEMENT PROJECTS, PARTICULARLY ON PROJECTS THAT INVOLVE ONLY ASBESTOS REMOVAL.

MODIFY BELOW TO SUIT EACH PROJECT. COMPLY WITH OWNER'S REQUIREMENTS AND OFFICE POLICY.

- A. **Submit full-size, fully fabricated Samples** cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
 - 1. Mount or display Samples in the manner to facilitate review of qualities indicated. Prepare Samples to match the Designer's sample. Include the following:

AMPLIFY LIST BELOW AS NECESSARY TO SUIT PROJECT.

- a. Specification Section number and reference.
- b. Generic description of the Sample.
- c. Sample source.
- d. Product name or name of the manufacturer.
- e. Compliance with recognized standards.
- f. Availability and delivery time.
- 2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
 - a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least 3 multiple units that show approximate limits of the variations.

RETAIN SUBPARAGRAPH BELOW IF SAMPLES ILLUSTRATE THE ASSEMBLY OF DIFFERENT COMPONENTS THAT COMPRISE A SINGLE UNIT.

- 3. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

CONSIDER CHANGING THE NUMBER OF SETS IN SUBPARAGRAPH BELOW TO 1 OR 2, OR MODIFY TO COMPLY WITH OWNER'S REQUIREMENTS.

- B. Submittals:** Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit 3 sets. The Designer will return one set marked with the action taken.
 - 1. Maintain sets of Samples, as returned, at the Project Site, for quality comparisons throughout the course of construction.
 - 2. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
 - 3. Sample sets may be used to obtain final acceptance of the construction associated with each set.

RETAIN PARAGRAPH BELOW EVEN IF ANOTHER SET IS RETAINED AND SENT TO THE FIELD OFFICE BY OWNER'S REPRESENTATIVE FOR THAT PURPOSE.

- C. Distribution of Samples:** Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.

IF FIELD SAMPLES ARE NOT REQUIRED, DELETE SUBPARAGRAPH BELOW. FIELD SAMPLES MAY INCLUDE PAINTED SURFACES, FLOOR PATTERNS, INTEGRATED CEILINGS, MASONRY, AND SIMILAR ITEMS. REVIEW SECTIONS IN DIVISIONS 2 THROUGH 16 CAREFULLY BEFORE DELETING.

- 1. Field samples are full-size examples erected on-site to illustrate finishes, coatings, or finish materials and to establish the Project standard.
 - a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.8 QUALITY ASSURANCE SUBMITTALS

MODIFY BELOW TO SUIT EACH PROJECT. COMPLY WITH OWNER'S REQUIREMENTS AND OFFICE POLICY.

- A. Submit quality-control submittals,** including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.

REVISE PARAGRAPH BELOW TO COMPLY WITH SPECIFIC PROJECT REQUIREMENTS.

- B. Certifications:** Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.
 - 1. Signature:** Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

1.9 MISCELLANEOUS SUBMITTALS:

INCLUDE THE FOLLOWING PARAGRAPH ONLY AFTER SEEKING ADVICE OF LEGAL COUNSEL. ACCEPTING A SUBMITTAL OF MATERIAL SAFETY DATA SHEETS MAY EXPOSE THE DESIGNER TO LIABILITIES THAT ARE BEYOND THOSE INVOLVED IN A NORMAL CONSTRUCTION PROJECT. THIS COULD BE THE CASE EVEN IF THE SUBMITTAL IS STAMPED, "RECEIVED - NOT REVIEWED."

- A. Material Safety Data Sheets:** Process material safety data sheets as "product data." These are submitted for information purposes only, they will be returned with the action stamp, "Received - Not Reviewed."

GENERALLY DELETE THE FOLLOWING UNLESS SPECIFIC INSPECTIONS OR TESTING ARE REQUIRED BY THE SPECIFICATION. USUALLY ALL TESTING ON AN ASBESTOS ABATEMENT PROJECT WILL PROVIDED BY OWNER.

- B. Inspection and Test Reports:** Classify each inspection and test report as being either "shop drawings" or "product data" depending on whether the report is specially prepared for the project, or a standard publication of workmanship control testing at the point of production. Process inspection and test reports accordingly.

GENERALLY DELETE THE FOLLOWING OR REVISE TO COMPLY WITH SPECIFIC OWNER REQUIREMENTS.

- C. Project Photographs:** Furnish 2 prints each of 3 project photographs at monthly intervals. Comply with Designer's direction concerning desired vantage points for shots.
- D. Records of Actual Work:** Furnish 4 copies of records of actual work, one of which will be returned for inclusion in the record documents as specified in section "Project Closeout".

GENERALLY DELETE THE FOLLOWING UNLESS THERE ARE SPECIFIC STANDARDS FOR WHICH A SUBMISSION IS DESIRED. THIS COULD BE A VERY EXPENSIVE REQUIREMENT. MANY OF THE STANDARDS REFERENCED IN THIS DOCUMENT ARE EXPENSIVE. POSSIBLY REVISE THE NEXT PARAGRAPH TO INCLUDE A COPY OF STANDARDS FOR THE OWNER'S RECORDS, WHERE NECESSARY.

- E. Standards:** Where submittal of a copy of standards is indicated, and except where copies of standards are specified as an integral part of a "Product Data" submittal, submit a single copy of standards for the Designer's use. Where workmanship, whether at the project site or elsewhere is governed by a standard, furnish additional copies of the standard to fabricators, installers and others involved in the performance of the work.

- F. **Closeout Submittals:** Refer to section "Project Closeout" and to individual sections of these specifications for specific submittal requirements of project closeout information.
- G. **Record Documents:** Furnish set of original documents as maintained on the project site. Along with original marked-up record drawings provide 2 photographic copies of marked-up drawings, which, at the Contractor's option, may be reduced to not less than half size.

1.10 DESIGNER’S ACTION

ARTICLE 4.2.7 OF AIA DOCUMENT A201 STATES THE ARCHITECT (DESIGNER) WILL REVIEW AND APPROVE OR TAKE OTHER APPROPRIATE ACTION UPON THE CONTRACTOR'S SUBMITTALS..." TO COMPLY WITH LANGUAGE IN AIA DOCUMENT A201, THIS SECTION USES THE WORD "APPROVED" IN THIS ARTICLE. UPON ADVICE OF LEGAL COUNSEL, MODIFY THE ARTICLE BY CHANGING THE WORD TO Milder PHRASE.

- A. Except for submittals for the record or information, where action and return is required, the Designer will review each submittal, mark to indicate action taken, and return promptly.
 - 1. Compliance with specified characteristics is the Contractor's responsibility.

REQUIREMENTS BELOW ILLUSTRATE THE POLICY FOLLOWED BY MANY OFFICES. REVISE TO REFLECT PROJECT REQUIREMENTS.

MANY ARCHITECTURAL OFFICES USE A STAMP TO INDICATE THE ACTION TAKEN. RETAIN PARAGRAPH BELOW WHEN USING AN ACTION STAMP, OR SUBSTITUTE ANOTHER SYSTEM.

- B. **Action Stamp:** The Designer will stamp each submittal with a uniform, action stamp. The Designer will mark the stamp appropriately to indicate the action taken, as follows:
 - 1. **Final Unrestricted Release:** When the Designer marks a submittal "Approved," the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
 - 2. **Final-But-Restricted Release:** When the Designer marks a submittal "Approved as Noted," the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
 - 3. **Returned for Resubmittal:** When the Designer marks a submittal "Not Approved, Revise and Resubmit," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.
 - a. Do not use, or allow others to use, submittals marked "Not Approved, Revise and Resubmit" at the Project Site or elsewhere where Work is in progress.
 - 4. **Received - Not Reviewed:** When the Designer marks a submittal "Received - Not Reviewed" this acknowledges that the submittal has been received. This action applies to materials that are to be submitted for information purposes only, and where no review or action by the Designer is required.

SUBPARAGRAPH BELOW IS FOR USE WHERE NEITHER APPROVAL NOR REJECTION IS AN APPROPRIATE ACTION FOR DESIGNER'S MARKING OF A SUBMITTAL. .

5. Other Action: Where a submittal is for information or record purposes or special processing or other activity, the Designer will return the submittal marked "Action Not Required."
- C. **Unsolicited Submittals:** The Designer will return unsolicited submittals to the sender without action.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01301

SECTION 01503 - TEMPORARY FACILITIES - ASBESTOS ABATEMENT

BASED ON SECTION 01500 "CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS" FROM MASTERSPEC® TEXT COPYRIGHTED IN 1994 BY AIA, THE AMERICAN INSTITUTE OF ARCHITECTS.

THIS SECTION HAS BEEN COMPLETELY REVISED FROM THE 2ND EDITION TO REFLECT THE CHANGES OF THE REVISED CORRESPONDING MASTERSPEC SECTION.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY

- A. **This Section includes requirements** for construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection.
- B. **Temporary utilities include**, but are not limited to, the following:

MODIFY LIST BELOW TO SUIT PROJECT.

1. Water service and distribution.
2. Temporary electric power and light.
3. Temporary heat.
4. Ventilation.
5. Telephone service.
6. Sanitary facilities, including drinking water.
7. Storm and sanitary sewer.

- C. **Support facilities include**, but are not limited to, the following:

MODIFY LIST BELOW TO SUIT PROJECT.

1. Field offices, laboratories and storage sheds.
2. Temporary enclosures.
3. Hoists and temporary elevator use.

- D. **Security and protection facilities include**, but are not limited to, the following:

MODIFY LIST BELOW TO SUIT PROJECT.

1. Temporary fire protection.
2. Barricades, warning signs, and lights.

1.3 DESCRIPTION OF REQUIREMENTS:

- A. General:** Provide temporary connection to existing building utilities or provide temporary facilities as required herein or as necessary to carry out the work.

1.4 SUBMITTALS

- A. Before the Start of Work:** Submit the following to the Designer for review. Begin no work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use or final-but-restricted use.

EDIT THE FOLLOWING LIST TO SUIT THE PROJECT

1. Hot water heater: Submit manufacturers name, model number, size in gallons (liters), heating capacity, power requirements.
2. Decontamination Unit Sub-panel: Submit product data.
3. Ground Fault Circuit Interrupters (GFCI): Submit product data.
4. Lamps and Light Fixtures: Submit product data.
5. Temporary Heating Units: Provide product data.
6. Temporary Cooling Units: Provide product data and installation instructions.
7. Self Contained Toilet Units: Provide product data and name of sub-contractor to be used for servicing self contained toilets. Submit method to used for servicing.
8. Fire Extinguishers: Provide product data. Submit schedule indicating location at job site and compliance with NFPA 10 and NFPA 241.

INCLUDE REQUIREMENTS FOR SUBMITTAL OF INSTALLATION DRAWINGS OF CRITICAL TEMPORARY UTILITIES, IF REQUIRED.

9. Temporary Utilities: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

DELETE THE REQUIREMENT BELOW ON PROJECTS OF SHORT DURATION AND ON SMALL PROJECTS WITH FEW TEMPORARY UTILITY REQUIREMENTS.

10. Implementation and Termination Schedule: Within 15 days of the date established for commencement of the Work, submit a schedule indicating implementation and termination of each temporary utility.

1.5 QUALITY ASSURANCE

- A. **Regulations:** Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

MODIFY LIST BELOW TO COMPLY WITH LOCAL REGULATIONS. INCLUDE REQUIREMENTS GOVERNING STORM DRAINAGE, DISPOSAL OF EXCESS EXCAVATION AND WASTE MATERIAL, AND SIMILAR REGULATIONS.

1. Building code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, fire department, and rescue squad rules.
5. Environmental protection regulations.

IF OWNER HAS MADE ENVIRONMENTAL IMPACT COMMITMENTS, ATTACH COPIES OR INDICATE WHERE THEY MAY BE EXAMINED.

- B. **Standards:** Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."
- C. **Electrical Service:** Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."
- D. **Inspections:** Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

REVISE BELOW TO MINIMIZE TEMPORARY USE OF PERMANENT UTILITIES, OR INSERT EXCEPTIONS TO PROVISIONS. DISCOURAGE ATTEMPTS TO DELAY ACTIVATION OF STANDPIPES AND SPRINKLERS.

- A. **Temporary Utilities:** Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.
- B. **Conditions of Use:** Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. General:** Provide new materials and equipment. If acceptable to the Designer, the Contractor may use undamaged, previously used materials and equipment in serviceable condition. Provide materials and equipment suitable for use intended.

DELETE MATERIALS AND EQUIPMENT THAT ARE NOT REQUIRED. ADD MATERIALS AS NECESSARY TO SUIT PROJECT.

- B. Lumber and Plywood:**

THE EXPENSE AND AVAILABILITY OF FIRE RETARDANT LUMBER CAN HAVE A SIGNIFICANT IMPACT ON THE COST OF THE PROJECT. THE DESIGNER MAY ALSO WANT TO CONSIDER THE USE OF FIRE RETARDANT PAINTS, ALTHOUGH THIS MAY EXCEED THE COST OF FIRE RETARDANT LUMBER. REVIEW SUBPARAGRAPH BELOW WITH OWNER'S INSURANCE CARRIER. MODIFY AS NECESSARY TO SUIT PROJECT.

- 1. For job-built temporary offices, shops, and sheds within the construction area, provide UL-labeled, fire-treated lumber and plywood for framing, sheathing, and siding.
 - 2. For fences and vision barriers, provide minimum 3/8-inch- (9.5mm) thick exterior plywood.
- C. Scaffolding:** Provide scaffolding, ladders and/or staging, etc. as necessary to accomplish the work of this contract. Scaffolding may be of 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 scaffolding shall comply with applicable OSHA provisions.
 - 1. Equip rungs of metal ladders, etc. with an abrasive non-slip surface.
 - 2. Provide a nonskid surface on scaffold surfaces subject to foot traffic.

2.2 WATER SERVICE

DELETE THE FOLLOWING PARAGRAPH WHEN WATER IS OBTAINED FROM THE OWNER'S WATER SYSTEM. THE DESIGNER MAY WANT TO ADD REQUIREMENTS FOR FLOW-SENSOR/HOSE/LEAK DETECTOR AND AUTOMATIC SHUT-OFF DEVICES FOR PREVENTING ACCIDENTAL FLOODING.

- A. Water:** Provide potable water approved by local health authorities.
- B. Temporary Water Service Connection:** Connections to the Owner's water system shall include backflow protection. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or

dripping valves shall be piped to the nearest drain or located over an existing sink or grade where water will not damage existing finishes or equipment. Provide separate hoses and/or pumps for shower water and amended water, without the possibility of cross connection.

- C. **Water Hoses:** Provide , heavy-duty, abrasion-resistant, flexible hoses in diameters and lengths necessary to adequately serve temporary facilities, and with a pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
 - 1. Provide water into each work area and to each Decontamination Unit. Provide fittings as required to allow for connection to existing wall hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment.

FOLLOWING IS USUALLY ADEQUATE ON SMALL PROJECTS WITH ONE DECONTAMINATION UNIT AND ONE ABATEMENT CREW. DELETE FOLLOWING WHERE HOT WATER WILL BE SUPPLIED FROM EXISTING BUILDING HOT WATER SYSTEM. EDIT AS REQUIRED FOR PROJECT SPECIFICS.

- D. **Hot Water Heater:** Provide UL rated minimum 40 gallon (150 liters) electric hot water heater to supply hot water for the Decontamination Unit shower. Activate from 30 amp circuit breaker located within the Decontamination Unit subpanel. Provide with relief valve compatible with water heater operation; pipe relief valve down to drip pan on floor with type L copper. Drip pans shall consist of a 12" X 12" X 6" (30 cm. X 30 cm. X 15 cm) deep pan, made of 19 gauge galvanized steel, with handles. A 3-quart (3 liter) kitchen saucepan may be substituted for this purpose. Drip pan shall be securely fastened to the hot water heater with bailing wire or similar material. Wiring of the hot water heater shall be in compliance with NEMA, NECA, and UL standards.

DELETE FOLLOWING WHEN BUILDING HOT WATER SYSTEM WILL BE SHUT DOWN OR OTHERWISE UNAVAILABLE FOR USE.

- E. **Hot Water:** may be secured from the building hot water system, provided backflow protection is installed at point of connection as described in this section under Temporary Water Service connection, and if authorized in writing by the Designer.

2.3 ELECTRICAL SERVICE:

- A. **General:** Comply with applicable NEMA, NECA and UL standards and governing regulations for materials and layout of temporary electric service.
- B. **Temporary Power:** Provide service to Decontamination Unit subpanel with minimum 60 amp, 2 pole circuit breaker or fused disconnect connected to the buildings main distribution panel. Subpanel and disconnect shall be sized and equipped to accommodate electrical equipment required for completion of the work.
 - 1. Connection to the building’s main distribution panel is to be made by a licensed electrician

- C. **Voltage Differences:** Provide identification warning signs at power outlets which are other than 110-120 volt power. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 volt plugs into higher voltage outlets. Dry type transformers shall be provided where required to provide voltages necessary for work operations.

DELETE THE NEXT PARAGRAPH IF THE CONTRACTOR IS TO HAVE OTHER OPTIONS.

- D. **Electrical Outlets:** Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters (GFCI), reset button, and pilot light for connection of power tools and equipment.
 - 1. Locate GFCI's exterior to Work Area so that circuits are protected prior to entry to Work Area. Provide circuit breaker type ground fault circuit interrupters (GFCI) equipped with test button and reset switch for circuits to be used for any purpose in work area, decontamination units, exterior, or as otherwise required by national electrical code, OSHA or other authority. Locate in panel exterior to Work Area.
- E. **Electrical Power Cords:** Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

MODIFY THE PARAGRAPH BELOW TO COORDINATE REQUIREMENTS WITH THE METHOD OF SUPPLYING ILLUMINATION, OR TO PERMIT OR REQUIRE OTHER TYPES OF LIGHTING.

- F. **Lamps and Light Fixtures:** Provide general service incandescent lamps or fluorescent lamps of wattage indicated or required for adequate illumination as required by the work or this section. Protect lamps with guard cages or tempered glass enclosures, where fixtures are exposed to breakage by construction operations. Provide vapor tight fixtures in work area and decontamination units. Provide exterior fixtures where fixtures are exposed to the weather or moisture.

INSERT OTHER INDUSTRY-SPONSORED PRODUCT SELECTION STANDARDS AS DESIRED, WHETHER LOCAL OR NATIONAL.

2.4 TEMPORARY HEAT:

- A. **Heating Units:** Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the fuel being consumed. Use steam or hot water radiant heat where available, and where not available use electric resistant fin radiation supplied from a branch circuit with ground fault circuit interrupter.

IT IS SOMETIMES NECESSARY TO COOL AND DEHUMIDIFY WORK AREAS IN HOT CLIMATES. THIS IS PARTICULARLY TRUE WHEN A PRESSURE DIFFERENTIAL SYSTEM IS USED THAT DOES NOT EXHAUST HEPA FILTERED FAN UNITS TO THE EXTERIOR. THE AMOUNT OF COOLING REQUIRED CAN BE DETERMINED USING NORMAL MECHANICAL ENGINEERING CALCULATIONS. FOLLOWING IS EXTREMELY GENERAL AND SHOULD BE REVISED TO FIT PROJECT REQUIREMENTS.

WINDOW AIR CONDITIONING UNITS ARE SOMETIMES USED FOR THIS PURPOSE. THE SEAL BETWEEN THE INSIDE AND OUTSIDE OF THESE UNITS CAN BE PROBLEMATIC AND SHOULD BE FREQUENTLY CHECKED.

DELETE FOLLOWING IF NO COOLING IS REQUIRED.

2.5 TEMPORARY COOLING:

- A. **Cooling Units:** Provide temporary cooling units consisting of a fan coil unit inside the work area with a compressor and heat rejection coil outside.

MODIFY PARAGRAPH BELOW TO ADD STRICTER REQUIREMENTS WHEN CONDITIONS WARRANT.

2.6 TEMPORARY STRUCTURES

- A. **Temporary Offices:** Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows, and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.

DELETE PARAGRAPH BELOW WHEN FIXTURES CONNECTED TO PREVIOUSLY INSTALLED WATER AND SEWER SERVICE MUST BE USED.

THE FOLLOWING DESCRIBES CHEMICAL TOILETS TO BE USED IN THE WORK AREA IF NO EXISTING FACILITIES ARE AVAILABLE. DELETE THIS PARAGRAPH WHEN EXISTING FIXTURES ARE AVAILABLE IN THE WORK AREA. IF THIS SECTION IS DELETED THEN ALSO DELETE THE PARAGRAPH IN PART 3 OF THIS SECTION THAT DESCRIBES WHERE SUCH UNITS ARE TO BE LOCATED.

- B. **Temporary Toilet Units:** Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

THE NEXT PARAGRAPH COULD BE MADE MORE SPECIFIC, EVEN FOR SMALL PROJECTS.

2.7 FIRST AID

- A. **First Aid Supplies:** Comply with governing regulations and recognized recommendations within the construction industry.

2.8 FIRE EXTINGUISHERS:

- A. **Fire Extinguishers:** Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.
- B. **Comply with NFPA 10 and NFPA 241** for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. **General:** Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. **Provide** each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

MODIFY BELOW TO SUIT PROJECT

- C. **Require** that personnel accomplishing this work be licensed as required by local authority for the work performed.
- D. **Relocate**, modify and extend services and facilities as required during the course of work so as to accommodate the entire work of the project.

3.2 SCAFFOLDING:

- A. **During the erection and/or moving** of scaffolding, care must be exercised so that the polyethylene floor covering is not damaged.
- B. **Clean** as necessary debris from non-slip surfaces.

- C. **At the completion of abatement work** clean construction aids within the work area, wrap in one layer of 6 mil (0.15 mm) polyethylene sheet and seal before removal from the Work Area.

IF THE OWNER DOES NOT PROVIDE UTILITIES, THE CONTRACTOR WILL USUALLY INCLUDE THE COST WITH HIS MARKUPS IN HIS PRICE.

3.3 TEMPORARY UTILITY INSTALLATION

- A. **General:** Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
 - 1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
 - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.

RETAIN SUBPARAGRAPH BELOW TO PREVENT EXTRA COST TO OWNER.

- 3. **Use Charges:** Cost or use charges for temporary facilities are not chargeable to the Owner or Designer. Neither the Owner nor Designer will accept cost or use charges as a basis of claims for Change Orders.

ADD PROVISIONS FOR WORK NOT IN CONTRACT BUT SERVED BY TEMPORARY FACILITIES, IF REQUIRED.

AMPLIFY PARAGRAPH BELOW BY ADDING PROVISIONS, SUCH AS PUMPING, IF NECESSARY TO SUIT PROJECT.

B. **Water Service:**

EDIT BELOW IF HOT WATER IS NOT AVAILABLE FROM EXISTING BUILDING SYSTEMS.

- 1. Water connection (without charge) to Owner's existing potable water system is limited to one 3/4" (19 mm) pipe-size connection, and a maximum flow of 10 g.p.m. (38 liters / minute) each to hot and cold water supply. Install using vacuum breakers or other backflow preventer as required by local authority. Hot water shall be supplied at a minimum temperature of 100 degrees F (35 degrees C). Supply hot and cold water to the Decontamination Unit in accordance with Section 01563.
 - a. Maintain hose connections and outlet valves in leakproof condition. Where finish work below an outlet might be damaged by spillage or leakage, provide a drip pan

of suitable size to minimize the possibility of water damage. Drain water promptly from pans as it accumulates.

2. Sterilization: Sterilize temporary water piping prior to use.

C. Electrical Service:

REVIEW REQUIREMENTS BELOW WITH OWNER'S LOCKOUT/TAGOUT POLICIES.

1. Lock out: Lock out all existing power to or through the work area as described below. Unless specifically noted otherwise existing power and lighting circuits to the Work Area are not to be used. All power and lighting to the Work Area and Decontamination facilities are to be provided from temporary electrical panel described below.
 - a. Comply with requirements to OSHA 29 CFR 1910.147 the control of hazardous energy lock out/tag out.
 - b. Lock out power to Work Area by switching off breakers serving power or lighting circuits in work area. Tagout breakers with notation "DANGER circuit being worked on". Lock panel and have all keys under control of authorized person who has locked pane.
 - c. Lock out power to circuits running through Work Area wherever possible by switching off and locking all breakers serving these circuits. Tag out breakers with notation "DANGER circuit being worked on". Sign and date danger tag. Lock panel and supply keys to authorized person who has applied locks. If circuits cannot be shut down for any reason, label at intervals of 4-feet" (1.25 meter) on center with signs reading, "DANGER live electric circuit. Electrocutation hazard." All asbestos abatement work in the vicinity of the live circuit is to be performed dry. All necessary notifications and procedures for dry removal are to be followed.
 - d. Lock out power to electrical equipment located in the work area, and to any fans or other equipment that is going to be worked on.
2. Temporary Electrical Panel: Provide temporary electrical panel sized and equipped to accommodate electrical equipment and lighting required by the work. Connect temporary panel to existing building electrical system. Protect with circuit breaker or fused disconnect. Locate temporary panel as directed by Owner or Designer. Panel is to be installed by a licences electrician.
3. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, ac 20 Ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

INSERT ADDITIONAL PROVISIONS FOR POWER DISTRIBUTION TO SUIT PROJECT.

4. **Circuit Protection:** Protect each circuit with a ground fault circuit interrupter (GFCI) of proper size located in the temporary panel. Do not use outlet type GFCI devices.

MODIFY THE PARAGRAPH BELOW TO SUIT PROJECT REQUIREMENTS.

5. **Temporary Wiring:** in the Work Area shall be type UF non-metallic sheathed cable located overhead and exposed for surveillance. Do not wire temporary lighting with plain, exposed (insulated) electrical conductors. Provide liquid tight enclosures or boxes for wiring devices.
6. **Number of Branch Circuits:** Provide sufficient branch circuits as required by the work. Branch circuits are to originate at temporary electrical panel. At minimum provide the following:
 - a. One Circuit for each HEPA filtered fan unit
 - b. For power tools and task lighting, provide one temporary 4-gang outlet in the following locations. Provide a separate 110-120 Volt, 20 Amp circuit for each 4-gang outlet (4 outlets per circuit).
 - c. One outlet in the work area for each 2500 square feet (225 square meters) of work area
 - d. One outlet at each decontamination unit, located in equipment room
7. 110-120 volt 20 amp branch circuits with 4-gang outlet for Owner's exclusive use while conducting visual inspection and air sampling during the work as follows:
 - a. One in each work area
 - b. One at clean side of each Decontamination Unit.
 - c. One at each exhaust location for HEPA filtered fan units
8. 110-120 volt 20 amp branch circuits with 4-gang outlet for Owner's exclusive use for conducting visual inspection and final air sampling as set forth in Section 01711 Project Decontamination as follows:
 - a. Five inside work area
 - b. Two outside work area in location designated by Designer

D. Temporary Lighting:

1. Lock out: Lock out existing power to lighting circuits in Work Area as described in section 01526 Temporary Enclosures. Unless specifically noted otherwise existing lighting circuits to the Work Area are not to be used. All lighting to the Work Area and Decontamination facilities is to be provided from temporary electrical panel described above.

REQUIREMENTS IN THE NEXT PARAGRAPH COULD BE EXPRESSED AS WATTS PER SQUARE FOOT OR FOOT-CANDLES (LUMENS / SQ METER) AT TABLE HEIGHT AND COULD BE SPECIFIED AS EITHER MINIMUM OR MAXIMUM REQUIREMENTS. REDUCE WATTAGE REQUIREMENTS TO CONSERVE ENERGY.

2. Provide the following or equivalent where natural lighting or existing building lighting does not meet the required light level:
 - a. One 200-watt incandescent lamp per 1000 square feet (92.9 square meters) of floor area, uniformly distributed, for general construction lighting, or equivalent illumination of a similar nature. In corridors and similar traffic areas provide one 100-watt incandescent lamp every 50 feet (15.2 meters) . In stair ways and at ladder runs, provide one lamp minimum per story, located to illuminate each landing and flight. Provide sufficient temporary lighting to ensure proper workmanship everywhere; by combined use of daylight, general lighting, and portable plug-in task lighting.
 - b. Provide lighting in areas where work is being preformed as required to supply a 100 foot candle (1,076 lumens/sq meter) minimum light level.
 - c. Provide lighting in any area being subjected to a visual inspection as required to supply a 100 foot candle (1,076 lumens/sq meter) minimum light level.
 - d. Provide lighting in the Decontamination Unit as required to supply a 50 foot candle (538 lumens/sq meter) minimum light level.
3. Number of Lighting Circuits: Provide sufficient lighting circuits as required by the work. Lighting circuits are to originate at temporary electrical panel.
4. Circuit Protection: Protect each circuit with a ground fault circuit interrupter (GFCI) of proper size located in the temporary panel.

E. Temporary Heat:

1. **General:** Provide temporary heat where indicated or needed for performance of the Work.

MODIFY PARAGRAPH BELOW AS NECESSARY. LP-GAS OR FUEL-OIL HEATERS ARE COMMONLY USED. STEAM OR HOT-WATER HEATERS, GAS-FIRED SPACE HEATERS, OR ELECTRIC UNIT HEATERS ARE ALSO OFTEN USED. WHERE FOSSIL FUELS OR GAS HEATERS ARE USED CONSIDERATION SHOULD BE GIVEN TO THE POTENTIAL FOR CARBON MONOXIDE GENERATION.

2. Heating Facilities: Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP-gas or fuel-oil heaters with individual space thermostatic control.

USUALLY RETAIN SUBPARAGRAPH BELOW. GASOLINE-BURNING AND SALAMANDER HEATING UNITS ARE USUALLY PROHIBITED.

- a. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.

REVISE BELOW TO SUIT PROJECT. EXCEPTIONS TO THE MINIMUM TEMPERATURE SPECIFIED IN THE FOLLOWING PARAGRAPHS SHOULD BE SPECIFIED IN INDIVIDUAL WORK SECTIONS. 50 DEGREES IS FREQUENTLY USED AS A REQUIREMENT WHERE DELICATE OR DRYING FINISHES ARE NOT INVOLVED.

3. Maintain a minimum temperature of 70 degrees F (21 degrees C). where finished work has been installed.

FOLLOWING INSURES A COMFORTABLE ENVIRONMENT FOR WORKER DECONTAMINATION.

4. Maintain a minimum temperature of 75 degrees F (24 degrees C).in the shower of the decontamination unit.

FOLLOWING PROVIDES A COMFORTABLE WORK ENVIRONMENT FOR WORKERS LIGHTLY CLAD IN ONLY PAPER SUITS.

5. Maintain a minimum temperature of 65 degrees F (18 degrees C) in the Work Area at all times that work is going on. At all other times and at completion of removal work, but before start of reconstruction work, maintain a minimum temperature of 50 degrees F (10 degrees C).

DELETE THE ABOVE AND USE THE FOLLOWING IF WORKERS ARE GOING TO BE PROVIDED WITH WARM CLOTHING WHICH WILL BE KEPT IN THE WORK AREA AND DISCARDED AT THE END OF THE WORK. IF THE FOLLOWING IS SELECTED EDIT THE SECTION ON "WORKER PROTECTION" TO INSURE THAT ADEQUATELY WARM CLOTHING IS PROVIDED TO WORKERS.

6. Maintain a minimum temperature of 50 degrees F (10 degrees C) in the Work Area at all times during and after removal work.

F. Temporary Cooling:

FOLLOWING IS AN EXAMPLE ONLY. THE AMOUNT OF COOLING REQUIRED IS DEPENDENT UPON MANY THINGS (OUTSIDE TEMPERATURE, HUMIDITY, EXPOSURE TO SUN, AMOUNT OF VENTILATION). AS A GENERAL RULE IT IS PREFERABLE TO SUPPLY TOO LITTLE RATHER THAN TOO MUCH COOLING AS THIS WILL CONTROL HUMIDITY BETTER. IF THE WORK AREA IS OVER-COOLED A FOG CAN DEVELOP IN THE SPACE. DETERMINE THE AMOUNT OF COOLING REQUIRED AND REVISE AS APPROPRIATE.

1. Required Cooling: Provide units sufficient to supply 20,000 BTU/hr (5,862 w) of cooling per 8,000 cubic feet (225 cubic meters) of work area.

G. Temporary Utilities

1. Temporary Telephones: Provide temporary telephone service throughout the construction period for personnel engaged in construction activities. Install telephone on a separate line for each temporary office and first-aid station.
2. Separate Telephone Lines: Provide additional telephone lines for the following:

MODIFY LIST BELOW TO SUIT PROJECT.

- a. Where an office has more than 2 occupants, install a telephone for each additional occupant or pair of occupants.
- b. Provide a dedicated telephone line for a fax machine in the field office.

DELETE SUBPARAGRAPH BELOW IF OWNER MAINTAINS A SEPARATE ON-SITE FIELD OFFICE.

- c. Provide a separate line for the Owner's use.
- d. At each telephone, post a list of emergency telephone numbers.

H. Sanitary Facilities:

1. Sanitary facilities include temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
 - a. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.

DELETE PARAGRAPH BELOW WHEN FACILITIES ARE NOT AVAILABLE OR USE IS NOT PERMITTED EVEN IF AVAILABLE.

2. Toilets: Use of the Owner's existing toilet facilities will be permitted, so long as facilities are cleaned and maintained in a condition acceptable to the Owner. At Substantial Completion, restore these facilities to the condition prevalent at the time of initial use.

RETAIN PARAGRAPH BELOW UNLESS FACILITIES CAN BE CONNECTED TO LOCAL WATER AND SEWER LINES.

3. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.

RETAIN SUBPARAGRAPH BELOW WITH EITHER OF THE 2 PARAGRAPHS ABOVE ON ALL BUT THE SMALLEST PROJECTS.

- 4. Provide separate facilities for male and female personnel.

PARAGRAPH BELOW MAY BE EXCESSIVE FOR SMALL AND MEDIUM SIZE PROJECTS.

- 5. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.

USUALLY RETAIN PARAGRAPH BELOW.

- 6. Drinking-Water Facilities: Provide containerized, tap-dispenser, bottled-water drinking-water units, including paper supply.

USUALLY RETAIN SUBPARAGRAPH BELOW.

- a. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F (7.2 to 12.8 deg C).

THE REQUIREMENTS FOR SEWER AND DRAINAGE DOES NOT INCLUDE REQUIREMENTS FOR THE FILTER SYSTEM ON THE WATER DISCHARGE FROM THE DECONTAMINATION UNITS. SEE THE DECONTAMINATION UNIT SECTION FOR REQUIREMENTS FOR THE FILTER SYSTEM.

- 7. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.

MODIFY SUBPARAGRAPH BELOW TO SUIT PROJECT

- a. Filter out excessive amounts of soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
- b. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.

3.4 SUPPORT FACILITIES INSTALLATION

- A. **Locate field offices**, field laboratories, storage sheds, and other temporary construction and support facilities for easy access.

1. Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

REVIEW PARAGRAPH BELOW WITH OWNER'S INSURANCE CARRIER. MODIFY AS NECESSARY TO SUIT PROJECT.

- B. **Provide incombustible construction** for offices, shops, and sheds located within the construction area or within 30 feet (9 m) of building lines. Comply with requirements of NFPA 241.

BELOW ARE EXAMPLES OF SPECIFYING FIELD OFFICES. MODIFY THE FOLLOWING TO SUIT REQUIREMENTS.

- C. **Project Administrator's Field Office:** Provide air conditioned, heated office space near the Work Area for professional person, suitably finished, furnished, equipped, locked, heated, naturally ventilated, lighted and wired with electrical power, not less than 250 sq. ft. (25 sq meters) floor area. Equip office with 1 telephone line and 1 telephone, and not less than 2 duplex convenience power outlets. In addition to 1 desk, 1 four drawer file cabinet and 3 chairs, furnish office with one 36 inches X 96 inches (1 m X 2.5 m) plan table, and one 24 inches X 48 inches (0.62 m X 1.25 m) work table near electrical power outlet. Provide portable office or use a suitable room as designated by Owner and relocate or add equipment as required to meet the above requirements.

ON SMALL PROJECTS THE FIELD OFFICE AND FIELD LABORATORY CAN BE COMBINED.

- D. **Field Laboratory:** Provide air conditioned, heated office space near the Work Area for a laboratory space, suitably finished, furnished, equipped, locked, heated, naturally ventilated, lighted and wired with electrical power, not less than 250 sq. ft. (25 sq meters) floor area. Equip field laboratory with 1 telephone line and 1 telephone, and not less than 2 duplex convenience power outlets. In addition to 1 desk, 1 four drawer file cabinet and 3 chairs, furnish office with one 36 inches X 96 inches (1 m X 2.5 m) plan table, and one 24 inches X 48 inches (0.62 m X 1.25 m) work table near electrical power outlet. Provide portable office or use a suitable room as designated by Owner and relocate or add equipment as required to meet the above requirements.
- E. **Field Offices and Laboratory:** Provide insulated, weather tight temporary offices of sufficient size to accommodate required personnel at the Project Site. Keep the office clean and orderly for use for small progress meetings. Furnish and equip offices as follows:

REVISE SUBPARAGRAPH BELOW BY ADDING ADDITIONAL ITEMS OF FURNITURE AS NEEDED.

1. Furnish with a desk and chairs, a 4-drawer file cabinet, plan table, plan rack, and a 6-shelf bookcase.

RETAIN SUBPARAGRAPH BELOW FOR LARGE PROJECTS WITH LONG CONSTRUCTION PERIODS.

2. Equip with a water cooler and private toilet complete with water closet, lavatory, and medicine cabinet unit with a mirror.

INSERT ADDITIONAL PARAGRAPHS TO INCLUDE OTHER EQUIPMENT, SUCH AS FAX MACHINES, COPYING MACHINES, AND COMPUTERS.

EXPAND PARAGRAPH BELOW TO SUIT PROJECT.

- F. Storage and Fabrication Sheds:** Install storage and fabrication sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on-site.

RETAIN PARAGRAPH BELOW. TEMPORARY ENCLOSURES ARE REQUIRED ON MOST PROJECTS AT SOME TIME DURING CONSTRUCTION. MODIFY AS NECESSARY TO SUIT PROJECT.

- G. Temporary Enclosures:** Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
 2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 sq. ft. (2.3 sq. m) or less with plywood or similar materials.
 3. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.

RETAIN SUBPARAGRAPH BELOW FOR LARGE AND HIGH-RISE PROJECTS. PROVISIONS MAY BE TOO EXPENSIVE FOR SMALL PROJECTS.

4. Where temporary wood or plywood enclosure exceeds 100 sq. ft. (9.2 sq. m) in area, use UL-labeled, fire-retardant-treated material for framing and main sheathing.

DELETE PARAGRAPH BELOW FOR LOW-RISE CONSTRUCTION OF LESS THAN 3 STORIES.

- H. Temporary Lifts and Hoists:** Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.5 FIRE PROTECTION FACILITIES INSTALLATION

MODIFY PARAGRAPH BELOW IF IT DOES NOT REPRESENT DESIRED ARRANGEMENT.

- A. **Except for use of permanent fire protection** as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Designer.

PARAGRAPH BELOW SPECIFIES CURRENTLY ACCEPTED REQUIREMENTS. MODIFY TO SUIT LOCAL CONDITIONS. REVIEW PROVISIONS WITH OWNER'S INSURANCE CARRIER TO SEE IF ADDITIONAL PROVISIONS ARE NECESSARY. REVIEW NFPA 241 BEFORE EDITING ANY OF THESE PROVISIONS.

- B. **Temporary Fire Protection:** Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires.
4. Prohibit smoking within any building, structure, other enclosures or in hazardous fire-exposure areas.

SELECT EITHER ABOVE OR BELOW

5. Prohibit smoking in hazardous fire-exposure areas.
6. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

- C. **Permanent Fire Protection:** At the earliest feasible date in each area of the Project, complete installation of the permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

WHEN SPRINKLER SYSTEMS OR OTHER PERMANENT FIRE-PROTECTION SYSTEMS ARE USED, ADD SPECIFIC REQUIREMENTS.

- D. **Barricades, Warning Signs, and Lights:** Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.

DELETE PARAGRAPH BELOW FOR RESTRICTED CITY AND URBAN SITES WHERE A COMBINATION FENCE AND COVERED WALKWAY OR SIDEWALK BRIDGE WILL BE USED.

- E. **Environmental Protection:** Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.

INSERT LOCAL CODE REFERENCES ON THIS SUBJECT. CONSIDER INDICATING HOURS WHEN NOISE-MAKING ACTIVITIES ARE PROHIBITED.

3.6 OPERATION, TERMINATION, AND REMOVAL

PARAGRAPH BELOW IS IMPORTANT WHERE ALLOWANCES FOR METERED USE OF TEMPORARY FACILITIES HAVE BEEN ESTABLISHED.

- A. **Supervision:** Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. **Maintenance:** Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
 - 2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. **Termination and Removal:** Unless the Designer requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.

CONSIDER INSERTING SPECIFIC REMOVAL REQUIREMENTS, AS ILLUSTRATED BELOW.

2. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:

CHECK SUBPARAGRAPHS BELOW FOR CONFLICT OR DUPLICATION WITH PROVISIONS IN OTHER SECTIONS, PARTICULARLY SECTION 01701.

- a. Replace air filters and clean inside of ductwork and housings.
- b. Replace significantly worn parts and parts subject to unusual operating conditions.
- c. Replace lamps burned out or noticeably dimmed by hours of use.

REVIEW FINAL DRAFT OF THIS SECTION WITH OWNER. ADVISE OWNER HOW ANY EXCEPTIONS TO ITS PROVISIONS MIGHT TRANSLATE INTO COSTS BORNE BY OWNER.

END OF SECTION 01503

SECTION 01513 - TEMPORARY PRESSURE DIFFERENTIAL AND AIR CIRCULATION SYSTEM

The work of this section has two distinct goals. The isolation of airborne contamination in the asbestos abatement project areas, and ventilation of the work area. The pressure in the work area is reduced below that in surrounding areas to prevent

airborne asbestos from escaping from the asbestos abatement project area. The fans that are used to produce the pressure differential are also used to ventilate the work area.

HEPA FILTERED FAN UNITS

High-Efficiency Particulate Air (HEPA) filtered fan units, frequently referred to as negative air machines are portable exhaust fan units equipped with a cascaded filter system that has a final HEPA filter. They are rugged machines housed in cabinets constructed of steel or other durable material that is able to withstand the abuse of life on asbestos abatement projects. These are demolition projects where equipment is typically subjected to rough handling. The machines need to be easily moved as work in any one abatement work area is of relatively short duration.

Frequently HEPA filtered fan units will need to be moved through buildings, up stairs and elevators, and through doors during set up of an abatement project. Most units are small enough (30 inches wide) to fit through standard-size doorways and are mounted on casters or wheels to make them easy to move around.

Filters: A typical HEPA-filtered exhaust unit has a cascaded arrangement of filters starting with a coarse (approximately 200) micron filter, an intermediate (approximately 50 micron) filter, and finally a HEPA (99.97% efficient 0.3 micron) filter. The two pre-filters are intended to prolong the life of the HEPA filter which would otherwise clog very quickly with heavy particles. The unit should be arranged so that all filters can be replaced from the intake (work area) end.

HEPA Filters: HEPA filters are constructed

with the filter media folded into closely pleated panels and completely sealed on all edges with a rigid frame. HEPA filters are individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 um dioctylphthalate (DOP) particles (Ultra high efficiency air (ULPA) filters with 99.99% efficiency are available). The filters are marked with the name of the manufacturer and given a serial number. The filter is labeled with its air flow rating, efficiency and resistance, and the direction of test air flow.

HEPA filters are rated at 0.3 microns, but are effective in stopping fibers with much smaller diameters. HEPA filters are a labyrinth type filter that looks something like a sponge under high magnification. To get through the filter a particle must follow a contorted and tortuous pathway. If a particle is too big to fit through this pathway it is stopped by the filter. The DOP smoke used to test HEPA filters consists of spherical globules. A HEPA filter has passageways small enough to stop smoke particles 0.3 microns or larger. In an asbestos abatement project area there are numerous airborne asbestos fibers which are less than 0.3 microns in diameter. This is particularly true toward the end of the project, and during the work area decontamination phase. If HEPA filters allowed these particles to pass through they would be relatively useless for abatement projects. Fortunately, asbestos fibers are longer than 0.3 microns. (ASHERA TEM clearance considers only fibers greater than 0.5 microns long). For the most

part, these fibers are long enough that they get caught in the bends of the tortuous paths through the filter and are unable to get through. As a result asbestos fibers with diameters less than 0.3 microns, because of their length, cannot get through the filter. In practical terms, an intact and properly operated HEPA filter is extremely effective in filtering the asbestos fibers generated during abatement work. However, the designer should keep in mind that the HEPA filter is rated and tested with a smoke with spherical particles, rather than with fibers. It is only through serendipity that these filters work well on thin (less than 0.3 micron) asbestos fibers. In critical applications, such as situations where HEPA filtered fan units must be exhausted into an occupied building, it is prudent to sample the air being exhausted. These samples should be analyzed by TEM as most fibers less than 0.3 microns thick will be too thin to be seen by PCM.

Substantial leakage can occur if the filter is improperly sealed or if the case leaks. Typically the filter is mounted in the fan unit with a continuous rubber gasket between the ridged filter frame and the filter housing of the fan unit. Damage to, or deformation of the filter, gasket or fan unit could prevent a tight seal. The seal between the filter and the fan housing is critical. Any leaking at this point will bypass the filter and allow unfiltered air into and through the unit. HEPA filters have a high resistance to passage of air (high static pressure). This means that a relatively small leak will allow a disproportionate amount of unfiltered air to by-pass the filter.

Instrumentation: Typically HEPA filtered exhausters are equipped with a Magnehelic gauge and an elapsed time meter. A Magnehelic gauge or a manometer is used to measure the pressure drop across the HEPA filters. The pressure drop will increase as the filter becomes loaded during use. As the filter becomes more loaded the air passing through the unit will decrease. At some point the filter will be so clogged that the amount of air passing through the machine will be inadequate for the needs of the project. The unit should have a table mounted on it indicating the useable air handling capacity of the unit in Cubic

feet per minute (CFM) for various static pressure readings. The static pressure at which the filters have become loaded and need to be changed should also be indicated. As a practical matter the CFM capacity of the machine at the filter replacement point should be used in calculating the number of machines needed for the project. The elapsed time meter shows the total accumulated hours of operation and allows the operator to better plan for filter changes and machine maintenance.

Safety and Warning Devices: HEPA filtered exhaust equipment should include the following safety and warning devices. An electrical (or mechanical) lockout to prevent the fan from operating unless a HEPA filter is mounted in the machine. An automatic shutdown system to stop the fan if the pressure drop across the HEPA filter is too low. This will stop the fan if the HEPA filter is ruptured or the air discharge is blocked. Warning lights to indicate normal operation (green), a pressure drop across the filters is too high (i.e., filter overloading) (yellow), and pressure drop is too low (i.e., rupture in HEPA filter or obstructed discharge) (red). An audible alarm if unit shuts down due to operation of safety systems.

Electrical components: HEPA filtered fan units are subjected to hard usage and are used in wet areas. It is important that the units are properly constructed with components appropriate for use in wet demolition project sites. Requiring that all electrical components be approved by the National Electrical Manufacturers Association (NEMA) and Underwriter's Laboratories (UL) will help to assure this. All component parts (motor, fan, fan housing, and cabinet) must be properly grounded. Each unit should be equipped with overload protection (circuit breaker or fuse) sized for the equipment. Note that this overload protection protects the equipment and prevents fires, but does not prevent a shock hazard for workers. The electrical supply to the unit should be protected with a ground-fault circuit interrupter (GFCI) to protect workers from potential shock hazards. Other sections of the NIBS Guide Specification contain requirements that all

electrical service to the work area be GFCI protected.

Fans: A fan is a machine that creates a pressure difference and causes airflow through the rotation of an impeller (rotating shaft with blades). The impeller imparts both static and kinetic energy to the air; in proportions depending on the type of fan. Centrifugal or squirrel cage type fans (similar to a furnace fan) are usually used in HEPA filtered fan units. The airflow from a centrifugal fan is perpendicular to the rotating shaft. This type fan is better able to generate the pressure differential required to move air through a HEPA filter. Axial fans (similar to a big window fan) can also be used, but will normally be found only on high capacity machines. .

Both fan capabilities are needed on asbestos abatement projects. The pressure differential is used to isolate the work area from other parts of the building and the moving air ventilates the work area.

The pressure differential is generally referred to as static pressure because it is measured as though there were a static condition and no air flow. Static pressure is measured by the height of a water column that the pressure can support. Atmospheric air pressure (14.7 pounds per square inch at sea level), for example, can support a column of water about 34 feet high. Pressure differentials inside ductwork and HVAC units are

small enough to be measured in inches of water. Pressure differentials for asbestos abatement design are measured in hundredths of an inch.

The ability of fans to move air and maintain pressure differential are inversely related. The more air the fan moves the less pressure differential it can maintain. Fans are rated by the pressure differential they can maintain for a given flow of air. The volume of air moved is measured in cubic feet per minute (CFM). Data on the relation between airflow and pressure differential for a fan is normally given for a range of airflows and is referred to as the fan's "performance curves." Maximum pressure differential is determined by measuring the pressure differential across the fan while it is exhausting air from a tightly sealed space. Maximum pressure differential for fans normally found in commercial HEPA-filtered exhaust machines will be on the order of 3.5 to 5.0 inches of water. But since it can require a static pressure of 2.5 inches of water to get air through a HEPA filter most of the capacity of the fan will be required to overcome the resistance of the filters. This means that the machines are relatively sensitive to the HEPA filter becoming plugged. Airflow and the ventilating capacity of the machine will be quickly reduced as the filters become clogged. It should also be noted that a typical rating for the squirrel-cage fans in most commercial units is on the order of 1.7 inches of water at 80% of maximum flow.

ISOLATION OF AIRBORNE CONTAMINATION

THERE IS NO SUCH THING IN THE REAL WORLD AS A PHYSICAL BARRIER THAT

WILL PREVENT THE SPREAD OF AIRBORNE CONTAMINATION TO SPACES ADJACENT

TO A WORK AREA. IT DOES NOT MATTER HOW MUCH SHEET PLASTIC, PLYWOOD AND CAULKING COMPOUND IS USED, NO BARRIER WILL BE COMPLETELY EFFECTIVE IN CONTAINING AIRBORNE ASBESTOS FIBERS. AUGMENTING THE

Asbestos abatement operations that disturb ACBM, will contaminate the work area with airborne asbestos fibers. The remainder of the building, and the outside, must be protected from this contamination. This is accomplished by sealing all points of entrance to the work area (including mechanical systems), and maintaining the work area at an air pressure lower than that of surrounding areas (above and below as well as adjacent to).

Pressure Differential: A pressure differential is created so that the air pressure in the work area is lower than that of surrounding areas. Sheet plastic barriers (critical barriers) alone are inadequate to prevent the spread of airborne asbestos fibers beyond the work area. When the work area is maintained at a lower air pressure than the surrounding areas, any leakage of air will be from outside the work area to inside it. Contaminated air is thus effectively prevented from escaping the work area.

The first step in a pressure differential isolation system is an overall reduction of pressure in the work area. In a one story building with no ductwork this can be accomplished by exhausting air from the space through a HEPA filter to the building exterior. In a multi-story building or where there are complicating factors such as ductwork systems, the individual weak points in the isolation must be identified and specific solutions designed. In many instances this will become an exercise in mechanical engineering. Several reference sources such as the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) *Handbook of Fundamentals* are available for methods of analysis. This evaluation discusses the general

PHYSICAL BARRIER BY MAINTAINING THE WORK AREA AT AN AIR PRESSURE LOWER THAN SURROUNDING SPACES IS THE ONLY EFFECTIVE METHOD OF INSURING ISOLATION.

principles and offers a number of examples, but it is not an exhaustive treatment of what can be a complex engineering problem. In high rise buildings or other complex structures a professional mechanical engineer or other professional skilled in the design of HVAC systems should be consulted.

Three of the possible methods of accomplishing a pressure differential have been patented. The pressure differential arrangement called "Negative Air System" by Anthony Natale, a contractor in New Jersey, was granted a patent (number 4,604,111) that applied to that specific scheme of ventilating an asbestos work area and isolating it with an air pressure differential. This method of work area ventilation and isolation (described here as an exhaust system) was and continues to be in widespread use. The holder of this patent, GPAC, had been selling licenses for the use of their system, and was enforcing infringement of its patent against contractors, designers and owners. It is reported that the Patent and Trademark Office (PTO), subsequently declared this patent unenforceable. The PTO's review commission has confirmed this ruling. Although the patent owner can press its case in federal court, it is no longer collecting fees or royalties associated with this patent. Another patent holder, Red Baron, issues a license to those who purchase the necessary equipment to set up the system. A third system, (described here as a recirculation system) was originally developed by Brand, is in the public domain, and is free of any obligation license, or ownership. There has been both litigation and threats of litigation for patent infringement. Legal counsel should be sought on the appropriate measures to protect against such litigation.

NATURAL PROCESSES

The natural forces exerted upon a building can produce appreciable air flows related to temperature and pressure differentials which they create. These imbalances need to be considered in the design of an abatement project:

Stack Effect: Warm air rises and cool air falls. This effect is most pronounced during cold weather. In high rise buildings this results in an upward movement of air through stair towers, elevator shafts, vertical chases or any other vertical space. Air will tend to infiltrate into the lower floors of a building, move upward through the building, and exfiltrate from upper floors. This upward air movement creates pressure imbalances vertically within the building and between the inside and outside of the building. This imbalance can easily overcome the pressure differential isolation of an abatement project.

Infiltration: Wind moving around a building creates a positive pressure area on the windward side and a negative pressure on the leeward side. This causes infiltration on the windward side, exfiltration on the leeward side, and air movement from one side of a floor to the other. The pressure differentials generated by wind can easily exceed those described above for abatement projects.

The effect of these natural forces can be calculated using standard mechanical engineering calculations. It is then a relatively simple process to determine the pressure differential needed in the work area to overcome typical combinations of natural forces. In some situations it may be simpler to positively pressurize a shaft or stair tower by pumping air from a HEPA-filtered fan unit into it. The fan unit used for this should not draw air from the work area.

MECHANICAL EQUIPMENT

Mechanical equipment in buildings which move air as either a purpose or a by-product of their operation also affect pressure differentials:

Ductwork: Return and exhaust air ducts can have static pressures of 2 to 3 inches of water. These numbers are quite high when compared with the 0.01 to 0.02 inches typical in asbestos abatement work areas. Negative pressures may also exist at elbows and transition points in supply air ductwork. Any areas of leakage will draw contaminated air into the duct and contaminate the building air supply.

It is not practical to lower work area pressures below the pressures in return air ducts. It is best to configure the work area so that all ductwork is outside of it. This may require the construction of tunnels through the work area, a roof over the top of it, or some other arrangement. Where this is impossible a zone of positive air pressure can be

created around the duct. This is accomplished by enclosing the duct and pumping in HEPA-filtered air. Any leakage into the ductwork will then be from the clean air in this positive pressure space. Before this arrangement is set up, the project designer should consider whether there may be asbestos-containing dust inside or on the duct that could be introduced into the HVAC system.

During project design the inside of ductwork can be tested for the presence of asbestos-containing dust that could be re-entrained during the work, or during either isolation or start-up of equipment. If such dust exists the project design must prevent the introduction of this dust into the building atmosphere.

Elevators: Elevator cars act as pistons as they travel through the shafts. High speed elevators, especially in single shafts, can develop appreciable positive air pressures ahead of the car and negative pressures behind.

Where an elevator opens onto an abatement floor, air can be pumped from HEPA-filtered exhaust units into a contained elevator vestibule so that it is positively pressurized relative to the work area, the decontamination unit, and the elevator shaft. Sealed doors and openings to elevator shafts can be further protected by a positive pressure space in

the same manner as used for ductwork. The entire elevator shaft can be positively pressurized either by exhausting HEPA-filtered fan units into it, or by arranging a fan to blow outside air into the shaft.

RELATIVE PRESSURE IN WORK AREA

The overall pressure differential between the work area and surrounding areas should be specified. The work area must continuously be maintained at an air pressure that is lower than that in any surrounding space in the building, or at any location in the immediate proximity outside of the building envelope.

Any defects in the building exterior that may allow a high infiltrations rate must be corrected before attempting to isolate an asbestos abatement work area with a pressure differential. Loose or cracked windows and doors, damaged or worn weatherstripping, cracked or porous walls, or holes will make the building interior extremely sensitive to pressure changes due to wind. Such defects can be temporarily remedied by sealing with tape, plywood, strippable coating or caulking. This sealing must be done before any sheet plastic is installed.

This pressure differential when measured across any physical or critical barrier must equal or exceed the natural or mechanical forces affecting the work area.

0.02 inches of water: This should be adequate to isolate a work area in a one story building where wind velocities are not expected to exceed 15 miles per hour, if windows and other infiltration points are well sealed. This pressure differential can be easily maintained with normal procedures, air circulation rates and available equipment. This is the minimum pressure differential that is required by OSHA (OSHA relates this to 4 air changes per hour).

0.03 inches (0.75 mm) of water: This is the maximum pressure differential that is practical to maintain without special practices. Sheet plastic barriers must be mechanically fastened to resist the skin stresses imposed by this pressure difference. In practice this will require diligence on the part of the contractor in maintaining critical and primary barriers in place. Air infiltration through penetrations in the building envelope, including improperly-sealed doors and windows, creates pressure behind the plastic that pulls it loose. It may be necessary to seal some penetrations, such as broken windows on the outside of containment.

0.04 inches (1 mm) of water: In tall buildings the effect of warm air rising produces a "stack effect." This effect predominates over wind pressures at heights around 5 stories. This pressure differential should be adequate to isolate a work area in a one story building where wind velocities are not expected to exceed 25 miles per hour, or a 5 story building where wind velocities are not expected to exceed 15 miles per hour. Special procedures are required to achieve and continuously maintain this pressure differential. Mechanical fastening of sheet plastic in a manner that distributes the loading at fasteners (plywood pads, duct tape edge reinforcement, etc.) is critical. This is the maximum pressure differential that can be measured with most commercially available pressure monitoring equipment designed for abatement work sites.

0.05 inches (1.27mm) of water: New Jersey allows abatement in occupied buildings

higher than four stories, , with special seals and a pressure differential of 0.05 inches of water (N.J.A.C. 5:23-8.19(c)). This requirement has been in effect and regularly attained since 1993.

0.10 inches (2.5 mm) of water: This is an upper limit on the pressure differential possible to develop. Pressures differentials at this level could develop lateral forces high enough to cause damage to walls or other building elements. A pressure of 0.1 inches (2.5 mm) of water is equal to 0.52 pounds per square foot (24.9 Pa) of surface area. This pressure is high enough that

partitions and other surfaces surrounding the work area should be evaluated for structural adequacy. Achieving this level will require specific and detailed design of enclosures systems. Typically reinforced sheet plastic and structural reinforcing of barriers, subdividing of a large surface areas, and scrupulous detailing of fastening systems will be required. Unless there are extenuating circumstances it is generally preferable to use a more moderate pressure differential and local isolation as described below.

ESTABLISHING THE PRESSURE DIFFERENTIAL

The number of units that must be exhausted to accomplish the pressure differential is dependent on how leak tight the work area is. The more leaks a work area has, the more air that will need to be exhausted to maintain the pressure differential. The higher the amount of air a fan is moving the lower the pressure differential it can maintain. Thus, the greater the number of leaks into the work area the larger the number of fans required to maintain the pressure differential. The number of leaks in the sheet plastic temporary enclosures that enclose the work area is dependent on building configuration, conflicting pipes, ductwork, conduit and equipment as well as workmanship. Contractors differ in their ability to deal with the complexities of sealing a work area. This makes it impossible to determine the number of units required to maintain a pressure differential during project design. This will need to be determined by experimentation on the job. It should be noted that there will be a separate requirement for ventilation of the work area that will be discussed later in this section. The number of machines necessary could be governed by ventilation requirements. Section 01053 gives a procedure for determining the number of machines required. It may be necessary to establish a positive pressure in some areas outside of the work

area (e.g. in stair towers, vertical chases, and elevator lobbies).

Venting: HEPA filtered fan units should be exhausted to the building exterior. If this is impossible to do, the HEPA fan unit should be vented into the inlet of a second unit. The second unit should then be vented into a controlled area in the building. The second unit provides additional protection against a HEPA filter failure. Verify with the manufacturers of equipment to be used that this arrangement will not result in premature equipment failure or other practical problem. The controlled area should be unoccupied and isolated from occupied portions of the building with at least critical barriers. This should be set up so that it can be decontaminated if something goes wrong with the HEPA filter in both machines. The air in the controlled area should be monitored at the start of abatement work to verify that the arrangement of HEPA fan units is working properly. Periodic monitoring should be performed to insure that there is not a HEPA filter failure. The controlled area should be specifically located either on the drawings or in the specifications.

POSITIVE PRESSURE SEALS

Elevators, Stair towers and Chases:

The pressure differentials described above will be inadequate to prevent the spread of airborne contamination to elevators, stair towers, and chases, particularly in high rise buildings. The pressure differentials developed by natural forces (stack effect and wind pressures) and piston effect of elevators will routinely exceed the somewhat subtle pressure reduction it is possible to maintain in a work area with portable fan units. These areas can be isolated by positive pressure seals. A seal with an air space is installed at doors to elevators and stair towers. The air space is then pressurized with HEPA filtered air so that it is at a pressure greater than either the work area or the shaft. In this manner if there is a leak in the seal clean air will lead from the seal into the work area or shaft. The pressure differential used may depend upon the low air flow shut down setting of the particular HEPA filtered fan unit used. Consult unit manufacturer for specific information. Positive pressure seals should generally be included for buildings greater than 5 stories in height or wherever there is a high speed elevator. Coordinate this work with limitations on use of elevators in section 01013 "summary of work - asbestos abatement." On large projects discuss requirements with elevator design and building engineers.

Pressurizing Spaces: Sometimes it is more feasible to increase the air pressure in the area outside of the work area than it is to create an

adequate negative pressure differential in the work area. Isolation of chases and enclosed stairs can frequently be accomplished by pressurizing the space. This technique also works for slow moving low rise elevators such as hydraulic units. Air used to pressurize the stair should be HEPA filtered if it is being taken from spaces of the building that have not been cleared by TEM for background airborne asbestos concentrations. Pressurizing stair towers and shafts is a low rise building procedure. Pressurization of stairs and shafts is difficult in high rise buildings. The particular method used for pressure isolation should be determined during project design.

Ductwork: Air pressures in operating return duct work will typically be appreciably lower than normal building spaces (frequently several inches of water static pressure). This pressure differential will easily overcome the subtle air pressure differences isolating the work area. The preferable method of isolation is to arrange the work area so that return air ductwork is outside and not immediately adjacent to the work area. Any duct running through the work area that leads to operating HVAC equipment should, if possible, be physically cut at the work area barriers. If a return air duct in the work area must remain in operation it should be isolated from the Work Area by an enclosure forming an annular space around the duct which is positively pressurized with HEPA filtered air.

AUXILIARY GENERATOR

In critical application an emergency generator may be desirable to maintain the work area isolation if there is a power failure. Asbestos abatement work will have to stop and the building will not occupied if there is a power outage. This means that airborne fiber levels in the work area will not

elevated by active disturbance of ACM, and that building mechanical equipment (HVAC units and elevators) will not be in operations. In these circumstances only enough fan units are needed to overcome natural forces operating on the building (stack effect, infiltration). The specification calls

for 50% of the units to be maintained in operation. This is typically adequate to maintain the work area at a pressure slightly below surrounding areas, but this should be verified and the requirement edited as necessary for a particular

project. Care should be used in locating the generator to avoid getting exhaust into the intake for the building HVAC system or supplied air respirator equipment.

AIR CIRCULATION IN THE WORK AREA

Air circulation can be either ventilation which is the introduction of outside air to the Work Area, or it can be the circulation and cleaning of air within the Work Area. Air circulation is also part of the engineering controls required by OSHA for worker protection.

Ventilation is usually accomplished by the passive introduction of makeup air. Air exhausted from the work area is replaced by air coming into the work area (make up air). This presumes that the source for makeup air is clean. If the cleanliness of makeup air is questionable it may be necessary to HEPA filter the makeup air. It is essentially impossible to generate a sufficiently low pressure in an asbestos abatement work area to draw make up air through a HEPA filter. This means that a fan will have to be used to supply make-up air through a HEPA filter (a new HEPA filtered fan unit can be used for this purpose). This complicates the design of the work area. The air flow volume (cubic meters per minute) exhausted (removed) from the workplace must exceed the amount of makeup air supplied to the enclosure in order for there to be a negative pressure in the work area.

Number of Air Changes: The number of air changes routinely maintained on asbestos abatement projects exceeds the 4 described in the EPA purple book. The following is based on field experience of a number of consultants with actual abatement projects. The air circulation rates given have proven to be both effective and practical to achieve. These rates are in general use on many abatement projects.

4 air changes per hour: This OSHA minimum requirement is adequate only where the work is expected to generate low airborne fiber levels. Examples of this kind of work include removal of wet air cell pipe insulation or non-friable materials, installation of gypsum board asbestos enclosures, and removal of vinyl asbestos floor tile. Air flow volume will need to be higher than this for enclosures with awkward shapes, enclosures with multiple openings, and operations employing several workers in the enclosure.

12 air changes per hour: This should be required where abatement work is expected to raise higher airborne fiber levels. Removal of chrysotile-containing surface treatments is a typical example of this work.

20 air changes per hour: This level of air circulation is appropriate where high airborne fiber counts are expected. Dry removal of chrysotile containing installations, removal of amosite or crocidolite-containing materials are examples of this type of work.

It is simple to calculate the number of units required to achieve a given level of air circulation. The volume of the work area is determined. The volume of air required per hour is determined by multiplying the work area volume by the number of air changes required per hour. Dividing this by the 60 minutes in an hour gives the total air circulation rate in cubic feet per minute (CFM). The capacity of the HEPA filtered fan units is rated in CFM. The number of units required can then be determined by dividing the total air circulation rate by the rate per unit. The CFM rating of the machine with a loaded HEPA filter should be used. One additional machine should be

added as a backup to allow for equipment failure or machine shutdown for filter changing.

The necessary air changes can be accomplished by an exhaust system where all air is exhausted from the work areas, or a recirculation system where air in the work area is circulated through HEPA fan units in the work area. In general the designer should determine if project specifics indicate a preference for one system. For example: temperatures in the work area where there are

operating uninsulated high pressure steam lines can be better controlled by large amounts of ventilation air which can be provided by the exhaust system. On the other hand it will be easier to keep a work area warm in a very cold climate if the recirculation system is used and the amount of make-up air is limited. If it makes no difference, the specification language in 01513 can be revised to permit the contractor the option of either system.

EXHAUST SYSTEM

In an Exhaust System the air circulation requirements are accomplished by exhausting all units from the Work Area. Generally, makeup air enters the work area primarily through the decontamination facilities. The work area is arranged so that the air crosses the entire work area and is exhausted on the opposite side from the decontamination units. The work is arranged so that air motion is away from the workers. In general, this is accomplished by locating HEPA filtered fan units on the opposite side of the work area from the decontamination unit, and phasing the work so it starts at the decontamination units and proceeds back toward the fan units. This is essentially the arrangement described as a "negative pressure system" patented by Anthony Natale and described in the EPA purple book. This system has the advantage of bringing large volumes of outside air into the work area. This reduces airborne asbestos levels, heat and humidity. This is most effective when the weather is temperate or when the work is on hot surfaces such as operating steam systems. The large volume of outside air introduced to the work area can be a problem during cold weather. Typically this air will have to be heated either by makeup air heaters or by drawing tempered air from the balance of the building. This system requires a decontamination unit that permits free passage of air into the work area but does not allow a reverse flow if there is a fan failure. Coordinate with section 01563 decontamination units

The location of fan units and makeup air sources can be shown on drawings, or located at the preconstruction meeting. Insure that the exhausted air is located away from adjacent personnel and intakes for HVAC systems. It may be necessary to temporarily remove windows or doors to allow exhausting to the building exterior. If this is the case or if other modifications to the building are required, this should be completely described in the drawings or specification. Use of decontamination units should be controlled so that only one unit is used at a time.

Supplemental makeup air inlets may be necessary if there is too much air flow through the decontamination units, or to avoid stagnant areas in the work area and promote good air circulation. Flaps should be installed over inlets to prevent back flow from the work area into clean areas if there is a negative pressure failure. If spray cement is applied to the back of the open flap and the wall plastic, this will act like a contact cement if the pressure fails and the flap closes. The flap will then have to be replaced or adjusted when the pressure differential is re-established.

If makeup air is coming from an asbestos-fiber-contaminated source or potentially contaminated, then it should pass through a HEPA filter before entering work area. If air is contaminated with other materials it may also require filtering. If this is done, supply air fans will be necessary to

overcome the resistance of the filters. Mounting a filter in the wall of the work area in the hopes that air will go through it is completely ineffective. Use of a HEPA filtered fan unit, with or without the HEPA filter, may be a practical means of introducing make-up air. Caution must be used to

insure that work area remains under a pressure differential. This is accomplished by insuring that more air is exhausted from the work area than is supplied to the work area.

RECIRCULATION SYSTEM

In a Recirculation System the required air circulation is accomplished by recirculating air in the Work Area through HEPA filtered fan units, rather than by exhausting air from the work area. Under this system HEPA fan units can be moved so that air circulation can be concentrated in the area where asbestos-containing materials are being disturbed. The ability to move the machines around freely also makes it easier to direct air flow to carry airborne fibers away from workers. This is essentially the arrangement known as the pressure differential containment system developed by the Brand Company, a large asbestos abatement contracting firm, as an alternative to the negative air system patented by Anthony Natale and described previously. This system has the advantage of limiting the amount of potentially contaminated air exhausted from the work area. This makes it the preferable system where the ability to exhaust to the building exterior is

problematic. It introduces less outside air making it more economical to operate in cold weather. Work area air can be mechanically cooled and dehumidified making it useful in extremely hot weather. The limited introduction of outside air may reduce the problems introduced if there are other fibrous materials in the building air (such as might occur in a paper plant). Humidity and temperature levels may be higher than with an exhaust system during mild weather. For work in very hot environments, such as operating boiler plants, this system will be less effective in controlling high temperatures. To work properly a high level of workmanship is required in erecting and maintaining critical barriers. This system requires a decontamination unit that is tightly sealed. This requires that air circulation in the decontamination units be provided independently of work area air circulation. Coordinate with section 01563 decontamination units

AIR CIRCULATION IN DECONTAMINATION UNITS

It is critical to worker safety that there be a sensible movement of air through the decontamination unit from the clean side of the shower toward the work area. This movement of air must be adequate to carry away airborne fibers that result from the decontamination and showering process so that the worker is breathing clean air when the respirator is removed. This will typically result in a drafty shower but a safe worker.

Pressure Differential Isolation: The decontamination units need to be set up so that they are isolated from the area outside of the work area, and also so that the individual spaces in the decontamination units are isolated. In the Personnel Decon: the Equipment Room can be at the same pressure as the work area, the Shower should be at an intermediate pressure that is higher than the Equipment Room but lower than the Clean Room. In the Equipment Decon: the Wash Room should be at a pressure above the work area,

but below the Holding Room and Load Out Area. The Holding Room should be at a pressure above the Wash Room but below the Load Out Area. In practice, these pressure differentials will be determined by observing air motion. Air will move from the area of high pressure to the area of low pressure.

Air Circulation: There must be a continuous movement of air from the area outside the work area through the decontamination unit into the

work area. In the Personnel Decontamination room air should move from the Clean Room through the Shower Room into the Equipment Room. It is particularly important that there be a sensible motion of air in the Shower Room in the breathing zone of the workers. In the Equipment Decon, the air should move from the Load Out Area through the Holding Room and Wash Room into the work area.

USE OF THE PRESSURE DIFFERENTIAL AND AIR CIRCULATION SYSTEM

HEPA filtered fan units draw enough current that each one needs to be on a separate circuit with a minimum 20 amp capacity. These circuits need to be installed as part of the electricity for the project and must be protected with a ground fault circuit interrupter (GFCI). It is risky to use existing building branch circuits, and this should not be allowed. All building branch circuits should be de-energized as part of the project set-up.

Correct operation of the Pressure Differential and Air Circulation System needs to be verified before abatement work begins. The pressure differential is checked with a portable manometer, and then should be continuously monitored and charted throughout the project. Air flow is checked by observing the motion of sheet plastic, such as at flapped doors, and with smoke tubes. Air flow

should then be checked before the start of each days work, or at the start of each shift. The equipment should be inspected before installation on the project to insure that HEPA filters are indeed installed, and that all safety cut-outs and warning lights and alarms are operational. Badly dented or deformed fan units should not be allowed on the job.

Operation of the Pressure Differential and Air Circulation System should begin before any asbestos-containing materials are disturbed and should remain in continuous operation until the area has been cleared for re-occupancy.

At the completion of all work the prefilter should be removed and properly disposed of and the intake end of the machine should be sealed before it is removed from the work area.

SECTION 01513 - TEMPORARY PRESSURE DIFFERENTIAL AND AIR CIRCULATION SYSTEM

TEMPORARY PRESSURE DIFFERENTIAL AND AIR CIRCULATION SYSTEMS ARE DESCRIBED BY OSHA AS NEGATIVE PRESSURE ENCLOSURES. THESE SYSTEMS ARE USUALLY SIMPLE TO SET UP ONCE SOME BASIC PRINCIPLES ARE UNDERSTOOD. HOWEVER, THESE CAN BECOME COMPLEX IN HIGH-RISE BUILDINGS AND IF THERE ARE ACTIVE HVAC SYSTEMS INVOLVED OR MACHINERY SUCH AS ELEVATORS. REFER TO THE EVALUATIONS FOR DISCUSSION ON THIS TOPIC.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to work of this section.

1.2 RELATED SECTIONS

DELETE THE FOLLOWING IF THERE ARE NO REQUIREMENTS SET FORTH IN SECTION 01503

- A. **Heating and cooling requirements** are set forth in Section 01503 Temporary Facilities - Asbestos Abatement.

BELOW MAY BE MORE APPROPRIATE IN THE PART OF SECTION 01013 "SUMMARY OF WORK - ASBESTOS ABATEMENT" THAT DESCRIBES THE OWNER'S MONITORING OF THE PROJECT. THE EQUIPMENT NECESSARY FOR THIS IS GENERALLY AVAILABLE FROM ASBESTOS ABATEMENT EQUIPMENT SUPPLIERS.

1.3 MONITORING

- A. **Continuously monitor** and record the pressure differential between the Work Area and the building outside of the Work Area with a monitoring device incorporating a continuous recorder (e.g. strip chart).

1.4 SUBMITTALS

- A. **Before Start of Work:** Submit design of pressure differential system to the Designer for review. Do not begin work until submittal is returned with the Designer's action stamp indicating that the submittal is returned for unrestricted use. Include in the submittal at a minimum:
 - 1. Number of HEPA filtered fan units required and the calculations necessary to determine the number of machines
 - 2. Description of projected air flow within Work Area and methods required to provide adequate air flow in all portions of the work area

3. Anticipated pressure differential across Work Area enclosures
4. Description of methods of testing for correct air flow and pressure differentials
5. Manufacturer's product data on the HEPA filtered fan units to be used
6. Location of the machines in the Work Area
7. Method of supplying adequate power to the machines and designation of building electrical panel(s) which will be supplying the power.
8. Description of work practices to insure that airborne fibers travel away from workers
9. Manufacturer's product data on equipment used to monitor pressure differential between inside and outside of Work Area.

INCLUDE THE NEXT THREE PARAGRAPHS IF AN AUXILIARY POWER SUPPLY FOR THE HEPA FILTERED FAN UNITS IS TO BE PROVIDED.

10. Manufacturer's product data on auxiliary generator to be used
 11. Manufacturer's product data on auxiliary power switch to be used
 12. Schematic diagram of power and auxiliary power supply to HEPA filtered fan units
- B. On a weekly basis:** Submit printout from pressure differential monitoring equipment. Mark printout with date and start of time for each day. Use printout paper that indicates elapsed time in intervals no greater than hours. Indicate on each days record times of starting and stopping abatement work, type of work in progress, breaks for lunch or other purposes, periods of stop work, and filter changes. Cut printout into segments by day, attach to 8 ½" by 11" [215 X 280 mm] paper. Label with project name, contractors name and date.

1.5 QUALITY ASSURANCE:

ADD ADDITIONAL MONITORING POSITIONS SUCH AS AT CRITICAL OCCUPIED ADJACENT AREAS.

- A. Monitor pressure differential** at Personnel and Equipment Decontamination Units with a differential pressure meter equipped with a continuous recorder. Meter shall be equipped with a warning buzzer which will sound if pressure differential drops below 0.02 inch [0.5 mm] of water.

PART 2 - PRODUCTS

2.1 HEPA FILTERED FAN UNITS:

- A. **General:** Supply the required number of HEPA filtered fan units to the site in accordance with these specifications. Use units that meet the following requirements.

 - B. **Cabinet:** Constructed of durable materials able to withstand damage from rough handling and transportation. The width of the cabinet should be less than 30 inches [0.76 meters] to fit through standard-size doorways. Provide units whose cabinets are:
 - 1. Factory-sealed to prevent asbestos-containing dust from being released during use, transport, or maintenance
 - 2. Arranged to provide access to and replacement of all air filters from intake end
 - 3. Mounted on casters or wheels

 - C. **Fans:** Rate capacity of fan according to usable air-moving capacity under actual operating conditions.

 - D. **HEPA Filters:** Provide units whose final filter is the HEPA type with the filter media (folded into closely pleated panels) completely sealed on all edges with a structurally rigid frame.
 - 1. Provide units with a continuous rubber gasket located between the filter and the filter housing to form a tight seal.
 - 2. Provide HEPA filters that are individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 um dioctylphthalate (DOP) particles when tested in accordance with Military Standard Number 282 and Army Instruction Manual 136-300-175A. Provide filters that bear a UL586 label to indicate ability to perform under specified conditions.
 - 3. Provide filters that are marked with: the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.
- ULTRA HIGH EFFICIENCY AIR (ULPA) FILTERS WITH 99.99% EFFICIENCY ARE AVAILABLE. DEPENDING UPON AVAILABILITY, REVISE THE ABOVE TO THIS MORE STRINGENT STANDARD FOR CRITICAL AREAS.
- 4. Pre-filters, which protect the final filter by removing the larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required. Provide units with the following pre-filters:
 - a. First-stage pre-filter: low-efficiency type (e.g., for particles 100 um and larger)
 - b. Second-stage (or intermediate) filter: medium efficiency (eg., effective for particles down to 5 um)
 - c. Provide units with pre-filters and intermediate filters installed either on or in the intake grid of the unit and held in place with special housings or clamps.

 - E. **Instrumentation:** Provide units equipped with:
 - 1. Magnehelic gauge or manometer to measure the pressure drop across filters and indicate when filters have become loaded and need to be changed
 - 2. A table indicating the usable air-handling capacity for various static pressure readings on the Magnehelic gauge affixed near the gauge for reference, or the Magnehelic reading

indicating at what point the filters should be changed, noting Cubic Feet per Minute (CFM) (Liters / Second (LPS)) air delivery at that point

3. Elapsed time meter to show the total accumulated hours of operation

F. Safety and Warning Devices: Provide units with the following safety and warning devices:

1. Electrical (or mechanical) lockout to prevent fan from operating without a HEPA filter
2. Automatic shutdown system to stop fan in the event of a rupture in the HEPA filter or blocked air discharge
3. Warning lights to indicate normal operation (green), too high a pressure drop across the filters (i.e., filter overloading) (yellow), and too low of a pressure drop (i.e., rupture in HEPA filter or obstructed discharge) (red)
4. Audible alarm if unit shuts down due to operation of safety systems

G. Electrical components: Provide units with electrical components approved by the National Electrical Manufacturers Association (NEMA) and Underwriter's Laboratories (UL). Each unit is to be equipped with overload protection sized for the equipment. The motor, fan, fan housing, and cabinet are to be grounded.

H. Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

RETAIN ABOVE OR BELOW, FOR NONPROPRIETARY OR SEMI-PROPRIETARY SPECIFICATION. ABOVE IS THE CURRENT REPLACEMENT FOR THE FORMER "OR EQUAL" CLAUSE.

I. Manufacturer: Subject to compliance with requirements, provide products of the following:

EDIT THE FOLLOWING LIST AS REQUIRED FOR PROJECT REQUIREMENTS.

1. **HEPA filtered Fan Units:** The following machines are standard 2000 CFM machines used in typical asbestos abatement jobs.

Aerospace America, Inc. "Aero-Clean 2000"
 900 Truman Parkway
 P.O. Box 189
 Bay City, Michigan 48707
 (517) 684-2121

Abatement Technologies "HEPA-AIRE 1990 and HEPA-AIRE 2000"
 3305 Breckinridge Blvd. #118
 Deluth, GA 30136
 (800) 634-9091 or (404) 925-2761

Global Consumer Services, Inc.

4615-1U E. Industrial St.
Sims Valley, CA 93063
(805) 579-0230

M-Tec Corp.
1300 W. Steel Rd.
Unit #2
Morrisville, PA 19067
(215) 295-8208

Micro-Trap
Alumina II

- 2. **Large Capacity:** The following are large capacity 5000-6000 CFM machines used on large asbestos abatement jobs.

Abatement Technologies
3305 Breckinridge Blvd. #118
Deluth, GA 30136
(800) 634-9091 or (404) 925-2761

"HEPA-AIRE 5000"
model H5000C

- 3. **Hazardous Locations:** The following are pneumatically powered machines for use in asbestos abatement jobs in hazardous locations where electric motors are prohibited.

Abatement Technologies
3305 Breckinridge Blvd. #118
Deluth, GA 30136
(800) 634-9091 or (404) 925-2761

"HEPA-AIRE PNEUMATIC"
model H2000P

INCLUDE THE FOLLOWING TWO PARAGRAPHS IF AN AUXILIARY POWER SUPPLY FOR THE HEPA FILTERED FAN UNITS IS TO BE PROVIDED.

DELETE IF NO AUXILIARY GENERATOR IS TO BE USED.

2.2 AUXILIARY GENERATOR:

- A. **Auxiliary Generator:** Provide a gasoline-powered self-starting generator with a capacity adequate to power a minimum of 50% of the HEPA filtered fan units in operation at any time during the work.

2.3 AUXILIARY POWER SWITCH:

- A. **Auxiliary Power Switch:** Provide a switching relay which will automatically start auxiliary generator and switch over power supplied to HEPA filtered fan units to auxiliary generator.

PART 3 - EXECUTION

AUGMENTING THE PHYSICAL BARRIER BY MAINTAINING THE WORK AREA AT AN AIR PRESSURE LOWER THAN SURROUNDING SPACES IS THE ONLY EFFECTIVE METHOD OF INSURING ISOLATION. ACCOMPLISHING THIS REQUIRES MORE THAN MERELY INSTALLING SOME PORTABLE HEPA FILTERED FAN UNITS. REFER TO EVALUATIONS FOR MORE INFORMATION ON THE DESIGN OF PRESSURE DIFFERENTIAL ISOLATION SYSTEMS.

THE FOLLOWING PARAGRAPHS OFFER EXAMPLES OF LANGUAGE APPLICABLE TO A NUMBER OF SITUATIONS BUT ARE NOT A COMPLETE TREATMENT OF WHAT CAN BE A COMPLEX ENGINEERING PROBLEM. IN HIGH RISE BUILDINGS OR OTHER COMPLEX STRUCTURES A PROFESSIONAL MECHANICAL ENGINEER OR OTHER PROFESSIONAL SKILLED IN THE DESIGN OF HVAC SYSTEMS SHOULD BE CONSULTED.

3.1 PRESSURE DIFFERENTIAL ISOLATION

- A. **Isolate the Work Area** from all adjacent areas or systems of the building with a Pressure Differential that will cause a movement of air from outside to inside at any breach in the physical isolation of the Work Area.
- B. **Relative Pressure in Work Area:** Continuously maintain the work area at an air pressure that is lower than that in any surrounding space in the building, or at any location in the immediate proximity outside of the building envelope. This pressure differential when measured across any physical or critical barrier must equal or exceed a static pressure of:

CHOOSE ONE OF THE FOLLOWING AND DELETE THE REST. REFER TO THE EVALUATIONS FOR A DISCUSSION ON THE SELECTION OF A PRESSURE DIFFERENTIAL.

FOLLOWING IS THE MINIMUM REQUIRED BY OSHA.

1. 0.02 inches (0.5 mm) of water.

THE FOLLOWING IS THE MAXIMUM PRESSURE DIFFERENTIAL IT IS PRACTICAL TO MAINTAIN WITHOUT SPECIAL PRACTICES. REFER TO EVALUATIONS.

2. 0.03 inches (0.75 mm) of water.

THE FOLLOWING SHOULD BE ADEQUATE TO ISOLATE A WORK AREA IN A ONE STORY BUILDING WHERE WIND VELOCITIES ARE NOT EXPECTED TO EXCEED 25 MILES PER HOUR, OR A 5 STORY BUILDING WHERE WIND VELOCITIES ARE NOT EXPECTED TO EXCEED 15 MILES PER HOUR. REFER TO EVALUATIONS.

3. 0.04 inches (1 mm) of water.

THE FOLLOWING IS ALLOWED FOR BUILDING OVER FOUR STORIES BY THE STATE OF NEW JERSEY IF SPECIAL SEALS ARE USED (N.J.A.C. 5:23-8.19(C)). REFER TO EVALUATIONS.

4. 0.05 inches (1.27 mm) of water.

FOLLOWING IS AN UPPER LIMIT ON THE PRESSURE DIFFERENTIAL POSSIBLE TO DEVELOP. PRESSURES DIFFERENTIALS AT THIS LEVEL COULD DEVELOP LATERAL FORCES HIGH ENOUGH TO CAUSE DAMAGE TO WALLS OR OTHER BUILDING ELEMENTS. ACHIEVING THIS LEVEL WILL REQUIRE SPECIFIC AND DETAILED DESIGN OF ENCLOSURES SYSTEMS. UNLESS THERE ARE EXTENUATING CIRCUMSTANCES IT IS GENERALLY PREFERABLE TO USE A MORE MODERATE PRESSURE DIFFERENTIAL AND LOCAL ISOLATION AS DESCRIBED BELOW. REFER TO EVALUATIONS FOR ADDITIONAL DISCUSSION.

5. 0.10 inches (2.5 mm) of water.

THE NUMBER OF UNITS THAT MUST BE EXHAUSTED IS DEPENDENT ON HOW LEAK TIGHT THE WORK AREA IS. THE FOLLOWING SETS OUT THE GROUND RULES FOR THE EMPIRICAL DETERMINATION OF THE REQUIRED NUMBER OF FANS. REFER TO EVALUATIONS FOR MORE DISCUSSION.

- C. Accomplish the pressure differential by exhausting** a sufficient number of HEPA filtered fan units from the work area. The number of units required will depend on machine characteristics, the seal at barriers, and required air circulation. The number of units will increase with increased make-up air or leaks into the Work Area. Determine the number of units required for pressure isolation by the following procedure:

1. Establish required air circulation in the work area, personnel and equipment decontamination units.
2. Establish isolation by increased pressure in adjacent areas or as part of seals where required.
3. Exhaust a sufficient number of units from the work area to develop the required pressure differential.
4. The required number of units is the number determined above plus one additional unit.

CHOOSE ONE OF THE TWO PARAGRAPHS BELOW. GENERALLY RETAIN FOLLOWING AS A PREFERABLE PROCEDURE.

5. Vent HEPA filtered fan units to outside of building unless authorized in writing by Designer.

FOLLOWING SHOULD ONLY BE USED WHERE IT IS NOT FEASIBLE TO EXHAUST TO THE BUILDING EXTERIOR. EDIT FOR PROJECT SPECIFICS. THE CONTROLLED AREA SHOULD BE SPECIFICALLY LOCATED EITHER ON THE DRAWINGS OR BELOW. THE SECOND UNIT PROVIDES ADDITIONAL PROTECTION AGAINST A HEPA FILTER FAILURE. VERIFY WITH MANUFACTURERS OF EQUIPMENT TO BE USED THAT THIS ARRANGEMENT WILL NOT RESULT IN PREMATURE EQUIPMENT FAILURE OR OTHER PRACTICAL PROBLEM.

6. Vent each HEPA filtered fan unit to inlet of second unit. Vent second unit to a controlled area in the building. Insure that controlled area is isolated from balance of building by critical barriers at all times that units are in operation.

ALWAYS RETAIN FOLLOWING PARAGRAPHS DESCRIBING DUCTING.

7. Mount units to exhaust directly or through disposable ductwork.

THE FOLLOWING INSURES THAT DUCTWORK USED PREVIOUSLY ON THE INTAKE (CONTAMINATED SIDE) WILL NOT BE USED.

8. Use only new ductwork except for sheet metal connections and elbows.
9. Use ductwork and fittings of same diameter or larger than discharge connection on fan unit.
10. Use inflatable, disposable plastic ductwork in lengths not greater than 100 feet (30 meters).
11. Use spiral wire-reinforced flex duct in lengths not greater than 50 feet (15 meters).
12. Arrange exhaust as required to inflate duct to a rigidity sufficient to prevent flapping.
13. If direction of discharge from fan unit is not aligned with duct use sheet metal elbow to change direction. Use six feet (2 meters) of spiral wire reinforced flex duct after direction change.

FOLLOWING IS A MINIMUM. ON LARGE PROJECTS DISCUSS REQUIREMENTS WITH ELEVATOR DESIGN AND BUILDING ENGINEERS. COORDINATE THIS WITH LIMITATIONS ON USE OF ELEVATORS IN SECTION 01013 "SUMMARY OF WORK - ASBESTOS ABATEMENT." EDIT BELOW TO AVOID DUPLICATION OR CONFLICT WITH REQUIREMENTS OF SECTION 01526 - TEMPORARY ENCLOSURES. REFER TO THE EVALUATIONS FOR DISCUSSION.

- D. **Isolation of elevators, stair towers, and return air intakes:** Erect seals with an air space at doors to elevators and stair towers. Pressurize this space with HEPA-filtered air so that it is at a pressure greater than either the Work Area elevator shaft or stair tower.

SELECT ONE OF THE PARAGRAPHS BELOW AND DELETE THE OTHER.

FOLLOWING IS NON-COMBUSTIBLE CONSTRUCTION AND SHOULD BE USED WHERE FIRE SAFETY IS A CONCERN OR WHERE REQUIRED BY LOCAL BUILDING OR FIRE CODES. IF THIS SECTION IS USED A SECTION ON GYPSUM DRYWALL SHOULD BE INCLUDED.

1. Fabricate seal by first sealing door with duct tape and 6 mil polyethylene. Construct a barrier from ½" (13 mm) gypsum board supported by 3-5/8" (92 mm) x 25 gauge metal studs at 16" (410 mm) on centers. Space face of barrier a minimum of 3" (76 mm) from face of door. Seal barrier with 6 mil (0.15 mm) sheet plastic and duct tape.

USE FOLLOWING WHERE SMALL AREAS ARE INVOLVED OR LOCATIONS SUCH AS SINGLE STORY BUILDINGS WHERE FIRE RESISTANCE IS LESS CRITICAL.

2. Fabricate seal by first sealing door with duct tape and 6 mil (0.15 mm) polyethylene. Construct a barrier from ½" (13mm) CDX plywood supported by 2" X 4" (51 mm x 102 mm) wood studs at 16" (410 mm) on centers. Space face of barrier a minimum of 3" (76 mm) from face of door. Seal barrier with 6 mil (0.15 mm) sheet plastic and duct tape.
3. Use plywood and framing lumber that is treated to be fire resistant.

THE PRESSURE DIFFERENTIAL INDICATED BELOW MAY HAVE TO BE CHANGED DEPENDING UPON THE LOW AIR FLOW SHUT DOWN SETTING OF THE PARTICULAR HEPA FILTERED FAN UNIT USED. CONSULT UNIT MANUFACTURER FOR SPECIFIC INFORMATION.

4. Pressurize space with exhaust from HEPA filtered fan unit. Continuously maintain a pressure differential with this space a minimum of 0.02 inches (0.5 mm) of water higher in static pressure than any adjacent space.
5. Locate HEPA filtered fan unit outside of work area. Fabricate a manifold as required to distribute air to individual spaces to be isolated. Provide relief venting at unit as required to prevent shut down due to low air flow while still maintaining required air pressure.

ISOLATION OF CHASES AND ENCLOSED STAIRS CAN FREQUENTLY BE ACCOMPLISHED BY PRESSURIZING THE SPACE RATHER THAN ERECTING A PRESSURIZED SEAL AS ABOVE. THE PARTICULAR METHOD USED SHOULD BE DETERMINED DURING PROJECT DESIGN. REFER TO THE EVALUATIONS FOR MORE DISCUSSION.

- E. Isolation of chases and enclosed stairs:** Pressurize chases and enclosed stairs with HEPA filtered air so that it is at a pressure greater than any adjacent work area.
1. Pressurize space with exhaust from HEPA filtered fan unit. Continuously maintain a pressure differential with this space a minimum of 0.02 (.5 mm) inches of water higher in static pressure than any adjacent work area.

FOLLOWING PARAGRAPH SHOULD BE USED WHERE PRESSURIZING AIR IS TAKEN FROM OUTSIDE OR FROM TEM-CLEARED PORTIONS OF THE BUILDING. THIS IS A LOW RISE BUILDING PROCEDURE. PRESSURIZATION OF SHAFTS IS DIFFICULT IN HIGH RISE BUILDING.

- F. Isolation of chases and enclosed stairs:** Pressurize chases and enclosed stairs so that they are at a pressure greater than any adjacent work area.
1. Pressurize space with centrifugal-type fans. Axial type fans are not to be used for this purpose. Continuously maintain a pressure differential in this space a minimum of 0.02 inches (0.5 mm) of water higher in static pressure than any adjacent work area.

THE PREFERABLE METHOD OF ISOLATION IS TO ARRANGE THE WORK AREA SO THAT RETURN AIR DUCTWORK IS OUTSIDE AND NOT IMMEDIATELY ADJACENT TO THE WORK AREA. ANY DUCT RUNNING THROUGH THE WORK AREA THAT LEADS TO OPERATING HVAC EQUIPMENT SHOULD, IF POSSIBLE, BE PHYSICALLY CUT AT THE WORK AREA BARRIERS.

IF A RETURN AIR DUCT IN THE WORK AREA MUST REMAIN IN OPERATION IT SHOULD BE ISOLATED AS DESCRIBED BELOW.

- G. Isolation of return air ductwork:** Return air duct work which must be kept operating is located in the Work Area. This duct work is to be isolated from the Work Area by an enclosure forming an annular space around the duct which is positively pressurized with HEPA filtered air.
1. Wrap the duct with 6 mil (0.15 mm) polyethylene. Seal all polyethylene seams with spray glue and duct tape.
 2. Enclose wrapped duct with two layers of polyethylene. Fabricate inner layer from 6 mil (0.15 mm) polyethylene with all seams sealed with spray glue and duct tape. Arrange outer

layer to support inner layer. Fabricate out of reinforced sheet plastic with seams sealed with spray glue and duct tape and reinforced with staples. Support outer layer with a frame work fabricated from 2" x 4"s (51 mm x 102 mm) at 24" (610 mm) on center. Enclosures less than 2'-6' in diameter may be reinforced with box strapping in lieu of wood framing.

FOLLOWING SHOULD BE USED WHEREVER ABATEMENT WORK IS BEING CARRIED OUT IN AN OCCUPIED BUILDING.

DELETE THE FOLLOWING IF AN AUXILIARY GENERATOR IS NOT TO BE USED.

3.2 AUXILIARY GENERATOR

- A. **Provide auxiliary gasoline-powered generator** located outside of the building in a location protected from the weather. Install the generator in a location so that the exhaust from the generator does not flow to any building ventilation or supplied air intakes. Arrange so that if a power failure occurs the generator automatically starts and supplies power to a minimum of 50% of the HEPA filtered fan units in operation.

3.3 AIR CIRCULATION IN THE WORK AREA:

- A. **Air Circulation:** For purposes of this section air circulation refers to either the introduction of outside air to the Work Area or the circulation and cleaning of air within the Work Area.
- B. **Air circulation in the Work Area** is a minimum requirement intended to help maintain airborne fiber counts at a level that does not significantly challenge the work area isolation measures. The Contractor may also use this air circulation as part of the engineering controls in the worker protection program.
- C. **Determining the Air circulation Requirements:** The air flow volume (cubic meters per minute) exhausted (removed) from the workplace must exceed the amount of makeup air supplied to the enclosure. Provide a fully operational air circulation system supplying a minimum of the following air circulation rate:

FOLLOWING IS A MINIMUM REQUIREMENT BY OSHA ADEQUATE ONLY WHERE THE WORK IS EXPECTED TO GENERATE LOW AIRBORNE FIBER LEVELS. REFER TO EVALUATIONS FOR DISCUSSION ON DETERMINING AIR CIRCULATION REQUIREMENTS.

- 1. 4 air changes per hour

FOLLOWING IS USED WHERE ABATEMENT WORK IS EXPECTED TO RAISE HIGHER AIRBORNE FIBER LEVELS. REMOVAL OF CHRYSOTILE-CONTAINING SURFACE TREATMENTS IS A TYPICAL EXAMPLE OF THIS WORK.

- 2. 12 air changes per hour

FOLLOWING IS APPROPRIATE WHERE HIGH AIRBORNE FIBER COUNTS ARE EXPECTED. DRY REMOVAL OF CHRYSOTILE CONTAINING INSTALLATIONS, REMOVAL OF AMOSITE OR CROCIDOLITE-CONTAINING MATERIALS ARE EXAMPLES OF THIS TYPE OF WORK.

- 3. 20 air changes per hour

D. Determine Number of Units needed to achieve required air circulation according to the following procedure:

- 1. Determine the volume in cubic feet of the work area by multiplying floor area by ceiling height. Determine total air circulation requirement in cubic feet per minute (CFM) for the work area by dividing this volume by 60 and multiplying by the air change rate.
- 2. Air Circulation Required in Cubic Feet of Air per Minute (CFM) =

$$\frac{\text{Volume of work area (cu. ft.)}}{60 \text{ (minutes per hour)}} \times \text{Number of air changes per hour}$$

DELETE ABOVE OR BELOW. BELOW IS THE CALCULATION FOR METRIC UNITS

- 3. Determine the volume in cubic meters of the work area by multiplying floor area by ceiling height. Determine total air circulation requirement in cubic feet per minute liters / second (LPS) for the work area by dividing this volume by 3.6 and multiplying by the air change rate.
- 4. Air Circulation Required in Liters / second=

$$\frac{\text{Volume of work area (cubic meters)}}{\text{hour} \times 3.6} \times \text{Number of air changes per hour}$$
- 5. Divide the air circulation requirement (CFM) ((LPS)) above by capacity of HEPA filtered fan unit(s) used. Capacity of a unit for purposes of this section is the capacity in cubic feet per minute (Liters / second) with fully loaded filters (pressure differential which causes loaded filter warning light to come on) in the machine's labeled operating characteristics.
- 6. Number of Units Needed =

$$\frac{\text{Air circulation Requirement (CFM) ((LPS))}}{\text{Capacity of Unit with Loaded Filters (CFM) ((LPS))}$$
- 7. Add one (1) additional unit as a backup in case of equipment failure or machine shutdown for filter changing.

FOLLOWING LANGUAGE SHOULD BE USED IF AN EXHAUST SYSTEM IS TO BE USED. DELETE IF A RECIRCULATION SYSTEM IS TO BE USED. THE FOLLOWING SECTIONS COULD BE REVISED TO PERMIT THE CONTRACTOR THE OPTION OF EITHER SYSTEM.

FOLLOWING IS ESSENTIALLY THE ARRANGEMENT DESCRIBED AS A "NEGATIVE PRESSURE SYSTEM" PATENTED BY ANTHONY NATALE. SEE EVALUATIONS.

3.4 EXHAUST SYSTEM:

- A. Pressure differential isolation and air circulation** and pressure differential in the Work Area are to be accomplished by an exhaust system as described below.
 - 1. Exhaust all units from the Work Area to meet air circulation requirement of this section.
 - 2. Location of HEPA Filtered Fan Units: Locate fan unit(s) so that makeup air enters work area primarily through decontamination facilities and traverses Work Area as much as possible. This may be accomplished by positioning the HEPA filtered fan unit(s) at a maximum distance from the worker access opening or other makeup air sources.

PREFERABLY THE LOCATION OF FAN UNITS AND MAKEUP AIR SOURCES SHOULD BE SHOWN ON DRAWINGS. A MINIMUM PRACTICE IS TO LOCATE THESE ITEMS AT PRECONSTRUCTION MEETING.

- 3. The end of the unit or its exhaust duct should be placed through an opening in the plastic barrier or wall covering. Seal plastic around the unit or duct with tape.
- 4. Vent to Outside of Building, unless authorized in writing by the Designer.
- 5. Air Handling Unit Exhaust: The exhaust plume from air handling units should be located away from adjacent personnel and intakes for HVAC systems.

THIS MAY INVOLVE THE USE OF ADDITIONAL LENGTHS OF FLEXIBLE OR RIGID DUCT CONNECTED TO THE AIR OUTLET AND ROUTED TO THE NEAREST OUTSIDE OPENING. WINDOW PANES WHICH HAVE TO BE REMOVED TEMPORARILY SHALL BE REINSTALLED AT THE COMPLETION OF THE WORK.

- 6. Decontamination Units: Arrange Work Area and decontamination units so that the majority of make up air comes through the Decontamination Units. Use only personnel or equipment Decontamination Unit at any time and seal the other so that make up air passes through unit in use.
- 7. Supplemental Makeup Air Inlets: Provide where required for proper air flow through the Work Area in location approved by the Designer by making openings in the plastic sheeting that allow air from outside the building into the Work Area. Locate auxiliary makeup air inlets as far as possible from the fan unit(s) (e.g., on an opposite wall), off the floor (preferably near the ceiling), and away from barriers that separate the Work Area from occupied clean areas. Cover with flaps to reseal automatically if the pressure differential system should shut down for any reason. Spray flap and around opening with spray adhesive so that if flap closes meeting surfaces are both covered with adhesive. Use adhesive that forms contact bond when dry.

FOLLOWING LANGUAGE SHOULD BE USE IF A RECIRCULATION SYSTEM IS TO BE USED. DELETE IF AN EXHAUST SYSTEM IS TO BE USED. THIS IS ESSENTIALLY THE ARRANGEMENT KNOWN AS THE PRESSURE DIFFERENTIAL CONTAINMENT SYSTEM DEVELOPED BY THE BRAND COMPANY, A LARGE ASBESTOS ABATEMENT CONTRACTING FIRM, AS AN ALTERNATIVE TO THE NEGATIVE AIR SYSTEM PATENTED BY ANTHONY NATALE.

3.5 RECIRCULATION SYSTEM:

- A. Pressure differential isolation and air circulation in the Work Area are to be accomplished by a recirculation system as described below.
 - 1. Recirculate air in the Work Area through HEPA filtered fan units to accomplish air circulation requirements of this section.
 - 2. Location of Fan Units: Locate HEPA filtered fan units so that air is circulated through all parts of the Work Area, and so that required pressure is maintained at all parts of Work Area geometry. Move units as necessary, so that in any location where asbestos-containing materials are being disturbed, air movement is directed away from employees, and toward the HEPA filter fan unit. Direct air flow in these locations so that it is predominantly toward workers' backs at the breathing zone elevation.

3.6 AIR CIRCULATION IN DECONTAMINATION UNITS:

IT IS CRITICAL TO WORKER SAFETY THAT THERE BE A SENSIBLE MOVEMENT OF AIR THROUGH THE DECONTAMINATION UNIT FROM THE CLEAN SIDE OF THE SHOWER TOWARD THE WORK AREA. THIS MOVEMENT OF AIR MUST BE ADEQUATE TO CARRY AWAY AIRBORNE FIBERS THAT RESULT FROM THE DECONTAMINATION AND SHOWERING PROCESS SO THAT THE WORKER IS BREATHING CLEAN AIR WHEN THE RESPIRATOR IS REMOVED. THIS WILL TYPICALLY RESULT IN A DRAFTY SHOWER BUT A SAFE WORKER.

- A. **Pressure Differential Isolation:** Continuously maintain the pressure differential required for the work area in the:
 - 1. Personnel Decontamination Unit: across the Shower Room with the Equipment Room at a lower pressure than the Clean room.
 - 2. Equipment Decontamination Unit: Across the Holding Room with the Wash Room at a lower pressure than the Clean Room.
- B. **Air Circulation:** Continuously maintain air circulation in Decontamination Units at same level as required for Work Area.
- C. **Air Movement:** Arrange air circulation through the Personnel Decontamination Unit so that it produces a movement of air from the Clean Room through the Shower Room into the Equipment Room. At each opening, the air flow velocity must be sufficient to provide visible indications of air movement into the work area.. The velocity of air flow within the enclosure must be adequate to remove airborne contamination from each worker's breathing zone without disturbing the asbestos-containing material on surfaces.

3.7 USE OF THE PRESSURE DIFFERENTIAL AND AIR CIRCULATION SYSTEM:

EDIT TO MATCH REQUIREMENTS OF SPECIFIC MACHINE SPECIFIED.

- A. **General:** Each unit shall be serviced by a dedicated minimum 115V-20A circuit with ground fault circuit interrupter (GFCI) supplied from temporary power supply installed under requirements of Section 01503 "Temporary Facilities." Do not use existing branch circuits to power fan units.
- B. **Air Flow Tests:** Air flow patterns will be checked before removal operations begin, at least once per operating shift and any time there is a question regarding the integrity of the enclosure. The primary test for air flow is to trace air currents with smoke tubes or other visual methods. Flow checks are made at each opening and at each doorway to demonstrate that air is being drawn into the enclosure and at each worker's position to show that air is being drawn away from the workers location and toward the HEPA filtration unit.
- C. **Demonstrate Condition of Equipment** for each HEPA filtered fan unit and pressure differential monitoring equipment including proper operation of the following:
 - 1. Squareness of HEPA Filter
 - 2. Condition of Seals
 - 3. Proper operation of all lights
 - 4. Proper operation of automatic shut down if exhaust is blocked
 - 5. Proper operation of alarms
 - 6. Proper operation of Magnehelic gauge
 - 7. Proper operation and calibration on pressure monitoring equipment
- D. **Demonstrate Operation** of the pressure differential system to the Designer will include, but not be limited to, the following:
 - 1. Plastic barriers and sheeting move lightly in toward Work Area,
 - 2. Curtain of decontamination units move lightly in toward Work Area,
 - 3. There is a noticeable movement of air through the Decontamination Unit.
 - 4. Use smoke tube to demonstrate air movement from Clean Room through Shower Room to Equipment Room.
 - 5. Use smoke tubes to demonstrate a definite motion of air across all areas in which work is to be performed.

IT MAY BE MORE PRACTICAL FOR THE PROJECT ADMINISTRATOR TO CONDUCT THE TEST BELOW.

- 6. Use a differential pressure meter or manometer to demonstrate the required pressure differential at every barrier separating the Work Area from the balance of the building, equipment, ductwork or outside.
 - 7. Modify the Pressure Differential System as necessary to demonstrate successfully the above.
- E. **Use of System During Abatement Operations:**
 - 1. Start fan units before beginning work (before any asbestos-containing material is disturbed). After abatement work has begun, run units continuously to maintain a constant pressure differential and air circulation until decontamination of the work area is complete.

Do not turn off units at the end of the work shift or when abatement operations temporarily stop.

2. **Monitoring Pressure Within the Enclosure:** After the initial air flow patterns have been checked, the static pressure must be monitored within the enclosure. Monitoring may be made using manometers, pressure gauges, or combinations of these devices. It is recommended that they be attached to alarms and strip chart recorders
3. Do not shut down air pressure differential system during encapsulating procedures, unless authorized by the Designer in writing. Supply sufficient pre-filters to allow frequent changes.
4. Start abatement work at a location farthest from the fan units and proceed toward them. If an electric power failure occurs, immediately stop all abatement work and do not resume until power is restored and fan units are operating again.
5. **Corrective Actions:** If the manometers or pressure gauges demonstrate a reduction in pressure differential below the required level, work should cease and the reason for the change investigated and appropriate changes made. The air flow patterns should be retested before work begins again.
6. At completion of abatement work, allow fan units to run as specified under section 01711, to remove airborne fibers that may have been generated during abatement work and cleanup and to purge the Work Area with clean makeup air. The units may be required to run for a longer time after decontamination, if dry or only partially wetted asbestos material was encountered during any abatement work.

F. Dismantling the System:

1. When a final inspection and the results of final air tests indicate that the area has been decontaminated, fan units may be removed from the Work Area. Before removal from the Work Area, remove and properly dispose of pre-filter, decontaminate exterior of machine and seal intake to the machine with 6 mil (0.15 mm) polyethylene to prevent environmental contamination from the filters.

END OF SECTION - 01513

SECTION 01526 - TEMPORARY ENCLOSURES

PART 1 - GENERAL

THIS SECTION IS FOR WORK INVOLVING CLASS I AND II ASBESTOS WORK.

1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of the Contract**, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this section.

1.2 SUBMITTALS:

- A. **Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal is returned for unrestricted use.

DELETE FOLLOWING IF STRIPPABLE COATINGS ARE NOT TO BE USED.

1. Strippable Coatings: Submit following:
 - a. Product description including major components and solvents.
 - b. Test report on ASTM E84 test of surface burning characteristics.
 - c. Manufacturer's installation instructions. Indicate portions applicable to the project and selected assemblies where the manufacturer offers alternatives.
 2. Spray Cement: Submit following:
 - a. Product description including major components and solvents.
 - b. Manufacturer's installation instructions. Indicate portions applicable to the project.
 3. Sheet Plastic: For fire retardant plastic submit test reports on NFPA 701 test.
 4. Signs: Submit samples of signs to be used.
- B. **Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal has been' "Received - Not Reviewed."
1. Material Safety Data Sheet: Submit Material Safety Data Sheets, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for the following:
 - a. Strippable Coating.
 - b. Spray Cement.

PART 2 - PRODUCTS

2.1 SHEET PLASTIC:

EDIT THE FOLLOWING LIST TO ELIMINATE THOSE TYPES OF PLASTIC NOT USED.

FOLLOWING IS MOST LIKELY TO BE FOUND ON THE JOB IN THE ABSENCE OF A MORE SPECIFIC REQUIREMENT

- A. Polyethylene Sheet:** A single polyethylene film in the largest sheet size possible to minimize seams, 6.0 mil (0.15 mm) thick , clear, frosted, or black as indicated.

FOLLOWING IS A GOOD GENERAL PRECAUTION AND SHOULD ALWAYS BE USED IN AREAS WHERE THERE COULD BE EXITING DIFFICULTIES IN CASE OF EMERGENCY (WORK AREAS ABOVE OR BELOW GRADE OR INTERIOR SPACES WITH LIMITED EXITS) OR THERE IS HOT EQUIPMENT OR A POTENTIAL FOR FIRE, SUCH AS IN A BOILER ROOM. FIRE RETARDANT SHEET PLASTIC IS CONSIDERABLY MORE EXPENSIVE THAN STANDARD PLASTIC

- B. Polyethylene Sheet:** Provide flame-resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick frosted or black as indicated.

REINFORCED PLASTIC SHOULD BE USED IN EXTERIOR APPLICATIONS WHERE THE SHEET IS EXPECTED TO BE STRESSED BY WINDS OR IN ANY LOCATION WHERE HIGH SKIN STRENGTH IS REQUIRED. FOLLOWING IS AN EXAMPLE OF LANGUAGE WHICH CAN BE USED. EDIT TO SUIT PROJECT REQUIREMENTS.

- C. Reinforced Polyethylene Sheet:** Where plastic sheet constitutes the only barrier between the work area and the building exterior, provide translucent, nylon reinforced or woven polyethylene, laminated, flame-resistant, polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick, frosted or black as indicated.

2.2 STRIPPABLE COATINGS:

DELETE THIS ENTIRE SUB-SECTION IF STRIPPABLE COATINGS (SPRAY PLASTIC) IS NOT TO BE USED.

STRIPPABLE COATINGS ARE RELATIVELY NEW MATERIALS WHICH ARE DESIGNED TO ADHERE TO SURFACES SUCH AS WALLS AND CEILINGS AND THEN BE REMOVED BY PEELING OFF. CARE MUST BE EXERCISED IN SELECTING FINISHES TO RECEIVE THIS TREATMENT. SUBSTRATES WITH A LOOSE FINISH CAN LOSE PART OF THE FINISH WHEN THE COATING IS PEELED OFF. THE MATERIAL MAY NOT PEEL CLEANLY FROM TEXTURED SURFACES, FABRICS OR CARPET.

STRIPPABLE COATINGS ARE EFFECTIVE IN CLEANING MANY SURFACES AND MAY FACILITATE PROJECT DECONTAMINATION.

IT IS A WISE PRECAUTION TO TEST THE STRIPPABLE COATING ON THE SUBSTRATES INVOLVED IN THE PROJECT DURING DESIGN.

- A. **Strippable Coatings:** Provide strippable coatings in aerosol cans or premixed for spray application formulated to adhere gently to surfaces and remove cleanly by peeling off at the completion of the work.
 - 1. Provide only water-based latex materials.
 - 2. Provide materials manufactured for the specific application required.

- B. **Wall coating:** designed to be easy to remove.

- C. **Floor coating:** designed to provide a tough film which resists spread of water beneath plastic layer.

- D. **Window coating:** recommended by the manufacturer for use on windows. Supply materials that are designed to be stable on glass in sunlight and resist the transmission of ultraviolet radiation.

- E. **Fire Safety:** Provide materials that meet the following requirements:
 - 1. When wet or while being installed:
 - a. Do not create combustible vapors
 - b. Have no flash point
 - c. Are not noxious
 - d. Department of Transportation category of non-flammable.
 - 2. When dry, material must have a Class A rating as a building material and meet the following requirements when tested in accordance with ASTM E-84:
 - a. Flame Spread no greater than 20
 - b. Fuel Contributed 0
 - c. Smoke Developed no more than 110

- F. **Deliver materials** to the job site in unopened, factory-labeled containers.

- G. **Available Manufacturers:** Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

RETAIN ABOVE FOR NONPROPRIETARY OR BELOW FOR SEMI-PROPRIETARY SPECIFICATION. REFER TO DIVISION 1 SECTION "SUBSTITUTIONS."

- H. **Manufacturer:** Subject to compliance with requirements, provide products of one of the following:

THE FOLLOWING IS A LIST OF FIRMS BELIEVED TO MANUFACTURE THIS PRODUCT. NO MANUFACTURERS HAVE BEEN INTENTIONALLY EXCLUDED AND NO ATTEMPT HAS BEEN MADE TO EVALUATE THESE PRODUCTS. ADDITIONAL SUPPLIERS MAY EXIST. PRODUCT LITERATURE SHOULD BE USED TO EVALUATE THESE PRODUCTS AND TO VERIFY THAT LISTED PRODUCTS COMPLY WITH THE SPECIFICATIONS AND MEET PROJECT REQUIREMENTS. VERIFY THAT PRODUCTS INDICATED ARE STILL BEING MANUFACTURED. EDIT OR ADD TO THE LIST AS APPROPRIATE TO THE PROJECT REQUIREMENTS.

1. Isotek Corporation Spray Poly
P.O. Box 29799
New Orleans, LA 70189-0799
(504)367-9856

2. H.B. Fuller Co. Spray Poly
3900 Jackson St., NE Part no. 3256
Minneapolis, MN 55421
(800) 328-4594

2.3 MISCELLANEOUS MATERIALS:

- A. **Duct Tape:** Provide duct tape in 2 inch or 3 inch (50 mm or 75 mm) widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.

- B. **Spray Cement:** Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

PART 3 - EXECUTION

3.1 SEQUENCE OF WORK:

- A. **Carry out work of this section sequentially.** Complete each of the following activities in accordance with requirements before proceeding to the next.
 1. Provide emergency exits and emergency lighting.
 2. Control access
 3. Provide respiratory and worker protection.
 4. Provide Critical Barriers.
 5. Prepare Area.
 6. Provide Primary Barriers.
 7. Provide Isolation Areas as required.
 8. Provide Secondary Barrier.

3.2 GENERAL:

- A. **Work Area:** the location where asbestos abatement work occurs. The Work Area is a variable of the extent of work of the Contract. It may be a portion of a room, a single room, or a complex of rooms. A "Work Area" is considered contaminated during the work, and must be isolated from the balance of the building, and decontaminated at the completion of the asbestos control work.

- B. Completely isolate the Work Area** from other parts of the building so as to prevent asbestos-containing dust or debris from passing beyond the isolated area. Should the area beyond the Work Area(s) become contaminated with asbestos-containing dust or debris as a consequence of the work, clean those areas in accordance with the procedures indicated in Section 01711. Perform all such required cleaning or decontamination at no additional cost to owner.

THE FOLLOWING SIX PARAGRAPHS ARE FROM THE NON-MANDATORY REQUIREMENTS OF OSHA 1926.1101.

- C.** Construct enclosures to provide an air-tight seal around ducts and openings into existing ventilation systems and around penetrations for electrical conduits, telephone wires, water lines, drain pipes, etc. Construct enclosures to be both airtight and watertight except for those openings designed to provide entry and/or air flow control.
- D. Size:** Construct enclosure with sufficient volume to encompass all of the working surfaces yet allow unencumbered movement by the worker(s), provide unrestricted air flow past the worker(s), and ensure walking surfaces can be kept free of tripping hazards.
- E. Shape:** The enclosure may be any shape that optimizes the flow of ventilation air past the worker(s).
- F. Structural Integrity:** The walls, ceilings and floors must be supported in such a manner that portions of the enclosure will not fall down during normal use.
- G. Barrier Supports:** Provide frames as necessary to support all unsupported spans of sheeting.
- H. Openings:** It is not necessary that the structure be airtight; openings may be designed to direct air flow. Such openings are to be located at a distance from active removal operations. They are to be designed to draw air into the enclosure under all anticipated circumstances. In the event that negative pressure is lost, they are to be fitted with either HEPA filters to trap dust or automatic trap doors that prevent dust from escaping the enclosure. Openings for exits are to be controlled by an airlock or a vestibule.
- I. Place all tools, scaffolding, staging, etc. necessary for the work in the area to be isolated prior to completion of Work Area isolation.**
- J. Areas Within an Enclosure:** Each enclosure consists of a work area, a decontamination area, and waste storage area. The work area where the asbestos removal operations occur are to be separated from both the waste storage area and the contamination control area by physical curtains, doors, and/or airflow patterns that force any airborne contamination back into the work area.
- K. Removing Mobile Objects:** Clean movable objects and remove them from the work area before an enclosure is constructed unless moving the objects creates a hazard. Mobile objects will be assumed to be asbestos contaminated and are to be either cleaned with amended water and a

HEPA vacuum and then removed from the area or wrapped and then disposed of as asbestos-contaminated waste.

- L. Disabling HVAC Systems:** The power to the heating, ventilation, and air conditioning systems that service the regulated area must be deactivated and locked out. All ducts, grills, access ports, windows and vents must be sealed off with two layers of plastic to prevent entrainment of contaminated air.

RETAIN BELOW IF HVAC MUST BE OPERABLE DURING THE ABATEMENT.

- M. Operating HVAC Systems in the regulated Area:** If components of a HVAC system located in the regulated area are connected to a system that will service another zone during the project, the portion of the duct in the regulated area must be sealed and pressurized. Necessary precautions include caulking the duct joints, covering all cracks and openings with two layers of sheeting, and pressurizing the duct throughout the duration of the project by restricting the return air flow. The power to the fan supplying the positive pressure should be locked "on" to prevent pressure loss.
- 1.** If fan providing positive pressure fails for any reason, immediately stop asbestos removal work, mist the area to reduce airborne fiber levels. Notify the Project Administrator. Do not re-start asbestos removal work until authorized by the Designer.
- N. Lockout power to Work Area** by switching off all breakers serving power or lighting circuits in work area. A lock and tag shall be placed on each breaker used to de-energize circuits and equipment with notation "DANGER circuit being worked on". Lock panel and have all keys under control of authorized person who has applied the locks.
- O. Lockout power** to circuits running through work area wherever possible by switching off all breakers or removing fuses serving these circuits. Label breakers with tape over breaker with notation "DANGER circuit being worked on". Lock panel and have all keys under control of authorized person who applied locks. If circuits cannot be shut down for any reason, label at intervals 4 feet (1.22 m) on center with signs reading, "DANGER live electric circuit. Electrocution hazard." Label circuits in hidden locations but which may be affected by the work in a similar manner.
- P. Inspection Windows:** Install inspection windows in locations shown on the plans or as directed by the Designer. Each inspection window is to have a 24 inch X 24 inch (610 X 610 mm) viewing area fabricated from 1/4 inch (6.35 mm) acrylic or polycarbonate sheet. Install window with top at 6 feet-6 inches (1.98 m) above floor height in a manner that provides unobstructed vision from outside to inside of the Work Area. Protect window from damage from scratching, dirt or any coatings used during the work. A sufficient number of windows are to be installed to provide observation of all portions of the Work Area that can be made visible from adjacent areas. Inspection windows that open into uncontrolled area are to be covered with a removable plywood hatch secured by lock and key. Provide keys to Designer for all such locks.

3.3 EMERGENCY EXITS:

A. Provide emergency exits and emergency lighting as set forth below:

1. Emergency Exits: At each existing exit door from the Work Area provide the following means for emergency exiting:
2. Arrange exit door so that it is secure from outside the Work area but permits exiting from the Work Area.
3. Mark outline of door on Primary and Critical Barriers with luminescent paint at least 1 inch (25.4 mm) wide. Hang a razor knife on a string beside outline. Arrange Critical and Primary barriers so that they can be easily cut with one pass of razor knife. Paint words "EMERGENCY EXIT" inside outline with luminescent paint in letters at least one foot high and 2 inches (50.8 mm) wide.

FOLLOWING ARE VERY GENERAL AND SHOULD BE REVISED FOR SPECIFIC PROJECT REQUIREMENTS. IT MAY BE POSSIBLE TO USE EXISTING BUILDING EXIT LIGHTS AND EMERGENCY LIGHTING. IF SO REVISE FOLLOWING TO REQUIRE CONTINUED OPERATION AND PROTECTION OF THIS EQUIPMENT.

4. Provide lighted EXIT sign at each exit.
5. Provide battery-operated emergency lighting that switches on automatically in the event of a power failure.

3.4 CONTROL ACCESS:

THE FIRST STEP IN AN ASBESTOS ABATEMENT PROJECT IS TO ISOLATE THE AREA SO THAT ONLY TRAINED WORKERS CAN ENTER AND LEAVE THROUGH A CONTROLLED ENTRANCE.

THIS SUBSECTION DESCRIBES THE MEASURES NECESSARY TO ACCOMPLISH THIS ISOLATION. THE ISOLATION IS ACCOMPLISHED ONLY AT THE COST OF EASE OF ACCESS AND EXITING FROM THE BUILDING.

IT IS VERY POSSIBLE THAT THE WORK AREA ISOLATION COULD AFFECT EMERGENCY EXITING FROM PORTIONS OF THE BUILDING BEYOND THE WORK AREA. IT MAY BE NECESSARY TO CLOSE DOWN THESE PORTIONS OF THE BUILDING TO AVOID A LIFE SAFETY HAZARD FOR OCCUPANTS OF THESE AREAS.

THE FOLLOWING COULD AFFECT EXITING FROM THE BUILDING AND CERTAINLY AFFECTS EXITING FROM THE WORK AREA. THIS CHANGE IN EXITING SHOULD BE REVIEWED TO INSURE THAT IT DOES NOT VIOLATE LOCAL BUILDING CODES OR THE NFPA LIFE SAFETY CODE. IT MAY BE NECESSARY TO CONSTRUCT TEMPORARY EXITS. THERE MAY BE SPECIFIC BUILDING CODE REQUIREMENTS GOVERNING THE LAYOUT AND CONSTRUCTION OF THESE EXITS.

ON INDUSTRIAL SITES WHERE THE ACTIVITIES OF ALL PERSONS IN THE AREA ARE CONTROLLED IT MAY BE UNNECESSARY TO CONTROL ACCESS BEYOND THE ERECTION OF WARNING SIGNS.

A. Isolate the Work Area to prevent entry by building occupants into Work Area or surrounding controlled areas. Accomplish isolation by the following:

FOLLOWING ARE EXAMPLES. EDIT AS REQUIRED BY PROJECT SPECIFICS.

CHAINING EXIT DOORS IS A CLEAR VIOLATION OF EXITING REQUIREMENTS OF ANY BUILDING OR LIFE SAFETY CODE. USE FOLLOWING ONLY IF ALTERNATIVE EXITING IS PROVIDED.

IF DOORS MUST BE CHAINED SHUT SUCH SPECIFIC DOORS SHOULD BE CALLED OUT OR LABELED ON DRAWINGS.

1. Submit to Designer a list of doors and other openings that must be secured to isolate Work Area. Include on list notation if door or opening is in an indicated exit route.
2. After receiving written authorization from the Designer lock all doors into Work Area, or, if doors cannot be locked, chain shut. Notify the local fire department of the list of doors/or other openings which must be chained or otherwise secured shut. Cover any signs that direct emergency exiting, either outside or inside of Work Area, to locked doors. Do not obstruct doors required for emergency exits from Work Area or from building.

FOLLOWING IS APPROPRIATE WHERE NON-COMBUSTIBLE CONSTRUCTION IS REQUIRED. IN SOME CIRCUMSTANCES, SUCH AS SMALL CLOSURES IN ONE STORY BUILDINGS, LESS EXPENSIVE WOOD CONSTRUCTION MIGHT BE SUBSTITUTED

3. After receiving written authorization from the Designer, construct partitions or closures across any opening into Work Area. Partitions are to be a minimum of 8 feet (2.44 meters) high.

CHOOSE ONE OF THE THREE BELOW AND DELETE THE OTHER TWO. MAKE SELECTION BASED ON LOCAL FIRE SAFETY AND BUILDING REGULATIONS.

4. Fabricate partitions from 3-5/8 inch (9.21 cm) , 25 gage metal studs with ½ inch (1.27 cm) gypsum board on both faces. Brace at intervals of 4 feet (1.22 m) on center.
5. Fabricate partitions from 2 inch X 4 inch (50.8mm X 101.6mm) wood studs with ½ inch (1.27 cm) plywood on both faces. Brace at intervals of 4 feet (1.25 m) on center.
6. Fabricate partitions from 2 inch X 4 inch (50.8 mm X 101.6 mm) wood studs with ½ inch (1.27 cm) plywood on both faces. Brace at intervals of 4 feet (1.22 m) on center. Use only fire retardant treated wood.

DELETE FOLLOWING IF NO FABRIC TYPE PARTITIONS.

7. Fabric-type folding partitions: provide temporary partitions across fabric-type folding doors or partitions into Work Area.

REVISE FOLLOWING AS REQUIRED TO PROVIDE SECURE LOCKING OF SPECIFIC PARTITION INVOLVED. DELETE IF NO RIGID FOLDING PARTITIONS ARE USED.

8. Rigid-type folding partitions: remove operating bar and latch on clean side of folding partitions. Fasten down operating lever with hook and chain or other secure device on

Work Area side. At completion of all abatement work reinstall bar and latch and adjust for proper operation.

DELETE THE FOLLOWING IF THERE ARE NO ELEVATORS. REVISE AS NECESSARY FOR PROJECT SPECIFICS. ELEVATOR LOCKOUT IN MANY INSTANCES IS ACCOMPLISHED BY THE OWNER RATHER THAN THE CONTRACTOR. IN HIGH RISE BUILDINGS MORE DETAIL WILL FREQUENTLY BE REQUIRED. COORDINATE WITH SECTION 01013 THAT DESCRIBES THE OWNER'S AND CONTRACTOR'S USE OF ELEVATORS.

9. Modify elevator controls to prevent elevators from stopping at doors in Work Areas. This work is to be performed by a qualified elevator technician.

FOLLOWING IS EXAMPLE LANGUAGE TO USE WHERE DOORS THAT ARE NEEDED FOR EXITING MUST BE SECURED. REVISE AS APPROPRIATE OR DELETE IF THERE ARE NO DOORS INTO THE WORK AREA. A DETERMINATION SHOULD BE MADE ABOUT EXITING REQUIREMENTS FROM THE WORK AREA. THE FOLLOWING SHOULD BE EDITED AS APPROPRIATE TO PERMIT ADEQUATE EXITING AND MINIMIZE THE NEED FOR REPLACEMENT OF LOCKSETS

10. Replace passage sets on doors required for exiting from Work Area with temporary locksets for duration of the project. Use entry type locksets that are key lockable from one side and always operable from inside. Install locksets with key side in stair tower and escape side on Work Area side. Provide one key to Owner and maintain one key in clean room of decontamination unit. After meeting Contractor release criteria set forth in Section 01711 Project Decontamination, reinstall original passage sets and adjust for proper operation.

- B. Locked Access:** Arrange Work Area so that the only access into Work Area is through lockable doors to personnel and equipment decontamination units.

CHOOSE ONE OR A COMBINATION OF THE FOLLOWING TWO PARAGRAPHS.

USE FOLLOWING IF THERE ARE NO DOORS WHICH CAN BE USED FOR CONTROLLING ACCESS.

1. Install temporary doors with entrance type locksets that are key lockable from the outside and always unlocked and operable from the inside. Do not use deadbolts or padlocks.

USE FOLLOWING IF THERE ARE EXISTING DOORS WHICH CAN BE USED TO CONTROL ACCESS.

2. Replace locksets or passage sets on doors leading to decontamination units with temporary locksets for duration of the project. Remove any deadbolts or padlocks. Use entry type locksets that are key lockable from outside and always unlocked and operable from inside. After meeting contractor release criteria set forth in Section 01711 Project Decontamination reinstall original locks, passage sets and locksets and adjust for proper operation.
3. Provide one key for each door to Owner, and Designer and maintain one key in clean room of decontamination unit (3 total).

- C. **Visual Barrier:** Where the Work Area is immediately adjacent to or within view of occupied areas, provide a visual barrier of opaque polyethylene sheeting at least 6 mil (0.15 mm) in thickness so that the work procedures are not visible to building occupants. Where this visual barrier would block natural light, substitute frosted or woven rip-stop sheet plastic in locations approved by the Designer.

CHOOSE ONE OF THE TWO SIGNAGE SCHEMES BELOW.

FOLLOWING IS APPROPRIATE FOR INDUSTRIAL SETTINGS OR NORMALLY UNOCCUPIED AREAS SUCH AS SCHOOLS DURING THE SUMMER OR CONTROLLED CONSTRUCTION SITES.

- D. **Demarcation.** Demarcate the regulated area in any manner that minimizes the number of persons within the area and protects persons outside the area from exposure to airborne concentrations of asbestos. Where critical barriers or negative pressure enclosures are used, they may demarcate the regulated area.
- E. **Access.** Limit access to regulated areas to authorized persons as defined by OSHA, and to the Owner, Designer, Project Administrator or a representative authorized by one of these entities.
- F. **Provide Warning Signs** at each locked door leading to Work Area reading as follows:

MODIFY LANGUAGE REQUIREMENTS DEPENDING UPON LOCALITY. OSHA REQUIRES WARNING SIGNS TO BE COMPREHENSIBLE TO NON-ENGLISH SPEAKING WORKERS.

- 1. Print text in both English and Spanish

Legend	Notation
KEEP OUT	3 inch (77 mm) Sans Serif Gothic or Block
BEYOND THIS POINT	1 inch (25.4 mm) Sans Serif Gothic or Block
ASBESTOS ABATEMENT WORK	1 inch (25.4 mm) Sans Serif Gothic or Block
IN PROGRESS	1 inch (25.4 mm) Sans Serif Gothic or Block
BREATHING ASBESTOS DUST MAY BE	14 Point Gothic
HAZARDOUS TO YOUR HEALTH	

FOLLOWING IS MORE APPROPRIATE IN SENSITIVE LOCATIONS SUCH AS OCCUPIED BUILDINGS.

- 2. Provide Warning Signs at each locked door leading to Work Area reading as follows

Legend	Notation
KEEP OUT	3 inch (77 mm) Sans Serif Gothic or Block
CONSTRUCTION	1 inch (25.4 mm) Sans Serif Gothic or Block
WORK AREA	1 inch (25.4 mm) Sans Serif Gothic or Block
PROTECTIVE CLOTHING REQUIRED	14 Point Gothic
BEYOND THIS POINT	

3. Immediately inside door and outside critical barriers post an approximately 20 inch by 14 inch (508 mm X 356 mm) manufactured caution sign displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926:

Legend

DANGER
 ASBESTOS
 CANCER AND LUNG DISEASE HAZARD
 AUTHORIZED PERSONNEL ONLY
 RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA

4. Provide spacing between respective lines at least equal to the height of the respective upper line.

3.5 ALTERNATE METHODS OF ENCLOSURE:

EDIT FOLLOWING IF SECTION 01632 ON SUBSTITUTIONS IS OMITTED FROM THE SPECIFICATION.

OSHA REQUIRES CERTIFICATION BY A CIH OR A PROFESSIONAL ENGINEER WHO ARE QUALIFIED AS A PROJECT DESIGNER FOR ALTERNATIVE WORK PRACTICES

- A. **Alternate methods** of containing the Work Area may be submitted to the Designer for approval in accordance with procedures set forth in Section 01632 Substitutions. Do not proceed with any such method(s) without prior written approval of the Designer.
- B. **Notification:** Before work which involves the removal of more than 25 linear or 10 square feet (7.5 linear meters or 3 square meters) of thermal system insulation or surfacing material is begun using an alternative method which has been the subject of required evaluation and certification. Send a copy of such evaluation and certification to the national office of OSHA, Office of Technical Support, Room N3653, 200 Constitution Avenue, NW, Washington, DC 20210 and to the Designer.
- C. **Use a control method** that encloses, contains or isolates the processes or source of airborne asbestos dust, or otherwise captures or redirects such dust before it enters the breathing zone of employees.

EDIT FOLLOWING IF THE OWNER WISHES TO ESTABLISH A VALUE BELOW THE PEL

- D. **Certification:** Submit a certification from a certified industrial hygienist (CIH) or licensed professional engineer who is also qualified as a project designer, who has evaluated the work area,

the projected work practices and the engineering controls and who certifies in writing that the planned control method is adequate to reduce direct and indirect employee exposure to below the PELs and any requirements of Section 01562 “Respiratory Protection” under worst-case conditions of use, and that the planned control method will prevent asbestos contamination outside the regulated area, as measured by clearance sampling which meets the requirements of EPA’s Asbestos in Schools rule issued under AHERA, or perimeter monitoring which meets the criteria of OSHA 1926.1101, and as determined in accordance with the portion of Section 01013 “Summary of Work - Asbestos Abatement” that describes the Owner’s monitoring of the project.

3.6 RESPIRATORY AND WORKER PROTECTION:

- A. **Before proceeding** beyond this point in providing Temporary Enclosures:
 - 1. Provide Worker Protection per Section 01560
 - 2. Provide Respiratory Protection per Section 01562
 - 3. Provide Personnel Decontamination Unit per Section 01563

3.7 CRITICAL BARRIERS:

- A. **Completely Separate** the Work Area from other portions of the building, and the outside by closing all openings with sheet plastic barriers at least 6 mil (0.15 mm) in thickness, or by sealing cracks leading out of Work Area with duct tape.
- B. **Individually seal** all ventilation openings (supply and exhaust), lighting fixtures, clocks, doorways, windows, convectors and speakers, and other openings into the Work Area with duct tape alone or with polyethylene sheeting at least 6 mil (0.15 mm) in thickness, taped securely in place with duct tape. Maintain seal until all work including Project Decontamination is completed. Take care in sealing of lighting fixtures to avoid melting or burning of sheeting.
- C. **Provide Sheet Plastic** barriers at least 6 mil (0.15 mm) in thickness as required to seal openings completely from the Work Area into adjacent areas. Seal the perimeter of all sheet plastic barriers with duct tape or spray cement.
- D. **Mechanically Support** sheet plastic independently of duct tape or spray cement seals so that seals do not support the weight of the plastic. Following are acceptable methods of supporting sheet plastic barriers. Alternative support methods may be used if approved in writing by the Designer.

FOLLOWING ARE EXAMPLES. EDIT AND INDICATE SPECIFIC METHODS OF SUPPORT APPROPRIATE TO PROJECT REQUIREMENTS. METHOD USED SHOULD PREVENT THE WEIGHT OF PLASTIC FROM BEING CARRIED BY ONLY DUCT TAPE OR SPRAY CEMENT.

- 1. Plywood squares 6 inch x 6 inch x 3/8 inch (152 mm x 152 mm x 9.53mm) held in place with one 6d smooth masonry nail or electro-galvanized common nail driven through center of the plywood and duct tape on plastic so that plywood clamps

plastic to the wall. Locate plywood squares at each end, corner and at maximum 4 feet (1.22 m) on centers.

2. Nylon or polypropylene rope or wire with a maximum unsupported span of 10 feet (3.05 m), minimum 1/4 inch (6.35 mm) in diameter suspended between supports securely fastened on either side of opening at maximum 1 foot (304.8 mm) below ceiling. Tighten rope so that it has 2 inches (50.8 mm) maximum dip. Drape plastic over rope from outside Work Area so that a two foot long flap of plastic extends over rope into Work Area. Staple or wire plastic to itself 1 inch (25.4 mm) below rope at maximum 6 inches (152 mm) on centers to form a sheath over rope. Lift flap and seal to ceiling with duct tape or spray cement. Seal loop at bottom of flap with duct tape. Erect entire assembly so that it hangs vertically without a "shelf" upon which debris could collect.

E. Provide Pressure Differential System per Section 01513.

1. Clean housings and ducts of all overspray materials prior to erection of any Critical Barrier that will restrict access.

3.8 PREPARE AREA:

- A. **Scaffolding:** If fixed scaffolding is to be used to provide access HEPA vacuum and wet clean area prior to scaffolding installation.
- B. **Remove all electrical and mechanical items**, such as lighting fixtures, clocks, diffusers, registers, escutcheon plates, etc. which cover any part of the surface to be worked on with the work.

THE LAST SENTENCE BELOW IS A FALL BACK WHICH SHOULD BE DELETED IF NEW FINISHES ARE TO BE PROVIDED.

- C. **Remove all general construction items** such as cabinets, casework, door and window trim, moldings, ceilings, trim, etc., which cover the surface of the work as required to prevent interference with the work. Clean, decontaminate and reinstall all such materials, upon completion of all removal work with materials, finishes, and workmanship to match existing installations before start of work.

BELOW IS A GOOD PRECAUTION. NOTE THAT THIS PARAGRAPH REQUIRES THE INCLUSION AND EDITING OF SECTION 01712 IN THE SPECIFICATION.

- D. **Clean all contaminated furniture**, equipment, and or supplies with a HEPA filtered vacuum cleaner or by wet cleaning, as specified in Section 01712 Cleaning and Decontamination Procedures, prior to being moved or covered. All equipment furniture, etc. is to be deemed contaminated unless specifically declared as uncontaminated on the drawings or in writing by the Designer.

FOLLOWING PREVENTS THE SPREAD OF CONTAMINATION DUE TO THE BELLOWS-LIKE PUMPING ACTION SOMETIMES OBSERVED IN SHEET PLASTIC BARRIERS.

- E. **Clean All Surfaces In Work Area** with a HEPA filtered vacuum or by wet wiping prior to the installation of primary barrier.
- F. **Cleaning and Sealing Surfaces:** After cleaning with water and a HEPA vacuum, surfaces of stationary objects should be covered with two layers of plastic sheeting. The sheeting should be secured with duct tape or an equivalent method to provide a tight seal around the object.

3.9 PRIMARY BARRIER:

- A. **Protect building and other surfaces** in the Work Area from damage from water and high humidity or from contamination from asbestos-containing debris, slurry or high airborne fiber levels by covering with a primary barrier as described below.

THE MEASURES TAKEN TO PROTECT BUILDING SURFACES WILL ALSO DAMAGE THEM. STRIPPABLE COATINGS MAY REMOVE LOOSE PAINT. DUCT TAPE AND SPRAY GLUE LEAVE RESIDUES AND ALSO PULL OFF LOOSE PAINT. MECHANICAL FASTENING OF SHEET PLASTIC LEAVES HOLES. THE REPAIR OF THIS UNAVOIDABLE DAMAGE SHOULD BE DEALT WITH DURING PROJECT DESIGN. THE SCOPE OF WORK FOR THE CONTRACTOR SHOULD CLEARLY INDICATE WHETHER REPAIR WORK IS A PART OF THE ABATEMENT CONTRACT OR IS BEING DONE LATER AS A PART OF A RENOVATION PROJECT.

AS A GENERAL RULE IT IS PRUDENT TO ASSUME THAT ALL PAINTED SURFACES (EXCEPT FOR HIGH PERFORMANCE COATING SUCH AS EPOXY OR COLD GLAZED CEMENTS) WILL HAVE TO BE REPAINTED. A DECISION ABOUT WHO WILL PROVIDE THIS REPAINTING SHOULD BE MADE DURING DESIGN.

USE EITHER THE SECTION BELOW ON STRIPPABLE COATING OR THE ONE ON SHEET PLASTIC DEPENDING ON THE TYPE OF PRIMARY BARRIERS TO BE USED.

DELETE THE FOLLOWING SECTION ON STRIPPABLE COATINGS IF THE PRIMARY BARRIERS ARE TO BE SHEET PLASTIC.

- 1. **Strippable Coating:** Protect surfaces in the Work Area with a strippable coating. Perform all work in strict compliance with manufacturer's instructions. Carry out work in the following sequence.
 - a. **Inspect:** Before start of coating work inspect all surfaces to be coated. Report on any surfaces that may be damaged by the material or any condition that may interfere with adhesion of the coating to a surface to the Designer before application of coating.
 - b. **Photograph or videotape** existing damage to affected surfaces and submit documentation to Designer.

SURFACES TO WHICH STRIPPABLE COATING IS TO BE APPLIED SHOULD BE TESTED TO MAKE SURE THAT THE COATING STRIPS CLEANLY WITHOUT PEELING THE SURFACE OFF THE SUBSTRATE. FOLLOWING IS A CATCHALL, IT IS FAR PREFERABLE TO TEST THE MATERIAL FIRST AND DESIGN THE PROJECT ACCORDINGLY. THE FOLLOWING MAY SAVE A DISASTER, BUT COULD RESULT IN A COSTLY EXTRA.

- c. Test Patches: Apply test patches as directed by Owner or Designer. Apply a small area of strippable coating to a hidden or obscure area of each surface in the Work Area to be coated. Allow to dry and peel off. Demonstrate results to Designer prior to coating entire area. Commence coating of area only after receiving written authorization from the Designer.

STRIPPABLE COATINGS CLEAN SMOOTH SURFACES BETTER THAN WET WIPING OR HEPA VACUUMING. DURING THIS PROCESS THEY MAY ALSO UNCOVER HIDDEN DEFECTS SUCH AS PROBLEMS WITH PAINT ADHESION. DURING PROJECT DESIGN THESE SURFACES SHOULD BE CHECKED TO DETERMINE IF ANY SUCH DEFECTS EXIST.

- d. Cover surfaces and equipment in work area from which coating may not strip cleanly.
- e. Cover shelving, clocks, light fixtures and other equipment with one layer of 6 mil (0.15 mm) sheet plastic.
- f. Cover fabric, paper, cork wall coverings or unpainted gypsum board with one layer of 6 mil (0.15 mm) sheet plastic.
- g. Tape over any cracks that are larger than 1/16 inch (1.59 mm).
- h. Tape over electrical outlets, switches, door locks etc.

THE FOLLOWING THREE PARAGRAPHS ADDRESS WOOD PANELING. REVISE AS APPROPRIATE FOR PROJECT SPECIFICS OR DELETE IF THERE IS NO WOOD PANELING IN THE WORK AREA.

PETROLEUM BASED WOOD FINISHES, PARTICULARLY WAXES MAY BE REMOVED FROM WOOD SURFACES ALONG WITH DIRT AND CONTAMINATION. WOOD SURFACES SHOULD BE TESTED DURING PROJECT DESIGN AND A DECISION MADE ABOUT WHETHER THEY SHOULD BE ISOLATED FROM THE CLEANING PROVIDED BY THE STRIPPABLE COATING. THE FOLLOWING PARAGRAPH ADDRESSES THE REFINISHING OF WOOD SURFACES. THIS PRESUMES THAT DESIGNER HAS DETERMINED WHAT IS APPROPRIATE.

- i. Wood paneling in area may have the finish partially removed by the strippable coating. These surfaces are to be coated directly with strippable coating and are not to be covered with sheet plastic. Refinishing of the this paneling will be accomplished by the Owner and is not a part of the work of this contract.

FOLLOWING IS APPROPRIATE IF VERY DELICATE WOOD PANELING IS IN THE WORK AREA.

- 1) Cover wood paneling in Work Area with one layer of 6 mil (0.15 mm) sheet plastic.

FOLLOWING IS A CATCH ALL AND SHOULD GENERALLY NOT BE USED. THE ISSUE OF FINISHES ON WOOD SURFACES SHOULD BE RESOLVED DURING DESIGN.

- 2) Apply small area of coating in concealed location to wood finishes in Work Area. If finish is removed when coating is stripped inform Designer. Cover wood surface with one layer of 6 mil (0.15 mm) sheet plastic unless otherwise notified by Designer.
- 3) Base bid is for direct coating of wood paneling.
- 4) If a layer of sheet plastic is necessary this will be a change to the Contract Sum. Submit proposal for change in Contract Sum for the addition of sheet plastic to the Designer.

GENERALLY CARPETING SHOULD BE REMOVED AND DISPOSED OF IN A SPACE WHICH CONTAINS FRIABLE ASBESTOS-CONTAINING MATERIALS (ACM). USE LANGUAGE BELOW IF CARPETING IS TO BE SAVED. IF THERE IS NO CARPET DELETE FOLLOWING.

- j. Cover carpeting with three (3) layers of polyethylene sheeting at least 6 mil (0.15 mm) in thickness. Place corrugated cardboard sheets between the top and middle layers of polyethylene.
- k. Do not use strippable coating as an adhesive to hold sheet plastic in place.
- l. Coat or cover windows into Work Area:

STRIPPABLE COATINGS DEGRADE IN ULTRAVIOLET LIGHT IN SUNLIGHT. THIS DEGRADATION CAN PREVENT THE MATERIAL FROM STRIPPING CLEANLY. USE ONE OF THE FOLLOWING THREE PARAGRAPHS DESCRIBING PROTECTION OF WINDOWS.

FOLLOWING IS PREFERABLE SOLUTION TO WINDOWS IF PROJECT DURATION IS TO BE LESS THAN 25 DAYS.

- 1) Coat windows with window coating applied in a minimum 10 mil (0.254 mm) thickness when wet.

FOLLOWING IS PREFERABLE WHERE PROJECT DURATION IS LONGER THAN 25 DAYS.

- 2) Cover windows with one layer of 6 mil (0.15 mm) sheet plastic. Cover sheet plastic with a thin but continuous coat of window or wall coating.

FOLLOWING SHOULD GENERALLY NOT BE USED AS IT COMPLETELY ELIMINATES NATURAL LIGHTING FROM THE WORK AREA.

- 3) Cover windows with one layer of black 6 mil (0.15 mm) plastic.

- m. Protect critical barriers: Install strippable coating so that it will not remove critical barriers during stripping of coating. Cover critical barriers comprised of sheet plastic with a second layer of sheet plastic configured to be removed with strippable coating. Protect critical barriers made from tape with a protective layer of sheet plastic or duct tape.
- n. Coat all surfaces in Work Area with strippable coating in following order.
 - 1) Walls: Coat seams, corners, and junctions vertically. Coat balance of walls horizontally lapping over vertical sprayed areas by 50%.
 - 2) Floor: Coat floor lapping wall by 12 inches (305mm). Start at point furthest from entrance to Work Area and work toward door.
 - 3) Use straight edge to shield ACM from coating during spray application.
- o. Apply: to a minimum of the following thicknesses. Thickness is to be measured when material is wet using a wet film thickness gauge.

SURFACE TO BE COATED	MINIMUM THICKNESS WHEN WET	REQUIRED COATING TYPE
Critical Barriers	Not Applicable	Sheet Plastic Covers
Glass	10 mil (0.254 mm)	Window Coating
Plastic Over Glass	2 mil (0.051 mm)	Wall Coating
Paneling Painted Walls, Wall Covering,	12 mil (0.305 mm)	Wall Coating
Glazed Tile Smoothly Painted Brick, Painted Concrete Block	15 mil (0.381 mm)	Wall Coating
Floors	15 mil (0.381 mm)	Floor Coating
Unpainted Brick, Unpainted Concrete Block, Rough Wood	20 mil (0.51 mm)	Wall Coating

- 1) Coat brick and concrete block with a sufficient thickness of coating to obscure color of substrate completely.

- 2) Do not apply over tacky or chalky adhesives remaining from carpet or other flooring covering removal.
- p. Respiratory protection: Require that all workers in Work Area from start of spray operation until all surfaces are dry use as a minimum requirement a half-face negative pressure respirator equipped with combination ammonia and HEPA type filter cartridges or other appropriate respiratory protection as required by OSHA 29 CFR 1926.1101(h)(2) and as specified in Section 01562 Respiratory Protection.
- q. Worker protection: Equip all workers in Work Area during spray operation with eye protection, disposable gloves, and disposable paper suits.
- r. Ventilation: during spraying operation maintain a minimum of 4 air changes per hour in the entire Work Area. Operate one additional HEPA filtered fan unit per spray operator in area while spraying is taking place.

ELEVATORS AND STAIR TOWERS IN HIGH RISE BUILDINGS REQUIRE SPECIFICALLY DESIGNED POSITIVE PRESSURE AREAS TO OVERCOME THE STACK EFFECT WHICH WILL ATTEMPT TO DRAW AIR FROM FLOORS BELOW THE MIDLINE OF THE BUILDING AND DISCHARGE IT ON FLOOR ABOVE. STACK EFFECT RESULTS IN THE POSSIBILITY OF SPREADING AIRBORNE ASBESTOS FIBERS THROUGHOUT A BUILDING.

FOLLOWING IS AN ABSOLUTE MINIMUM, AND MAY NOT BE ADEQUATE, PARTICULARLY IN HIGH RISE BUILDINGS. IN GENERAL, THE AREA IN FRONT OF ELEVATOR DOORS SHOULD BE POSITIVELY PRESSURIZED TO PREVENT THE PISTON ACTION OF THE ELEVATOR FROM DRAWING CONTAMINATION FROM THE WORK AREA INTO THE ELEVATOR SHAFT. REFER TO EVALUATIONS FOR SECTION 01513 "TEMPORARY PRESSURE DIFFERENTIAL & AIR CIRCULATION SYSTEM" FOR A DISCUSSION ON THIS MATTER. DELETE THE FOLLOWING IF THERE IS NO ELEVATOR ACCESS TO THE WORK AREA.

- 2. Sealing Elevators: If an elevator shaft is located in the regulated area, it should be either shut down or isolated by sealing with two layers of plastic sheeting. The sheeting should provide enough slack to accommodate the pressure changes in the shaft without breaking the air-tight seal.

SELECT EITHER ABOVE OR BELOW. THE ABOVE PASSAGE IS FROM THE NON-MANDATORY SECTION OF OSHA.

- 3. Elevator: Coat walls, floor and ceiling of elevator in same manner as Work Area. Arrange entry to Work Area so that elevator door is in a positively pressurized space outside the clean room of the decontamination unit. At completion of work clean elevator as set forth in Section 01711. Refer to Section 01013 Summary of the Work for additional requirements for protection of elevator.

DELETE ENTIRE SECTION BELOW ON SHEET PLASTIC IF STRIPPABLE COATING IS TO BE USED.

- 4. Sheet Plastic: Protect surfaces in the Work Area with two (2) layers of plastic sheeting on floor and walls, or as otherwise directed on the Contract Drawings or in writing by the Designer. Perform work in the following sequence.

- a. All seams in the sheeting should overlap, be staggered and not be located at corners or wall-to-floor joints.
- b. Cover Floor of Work Area with 2 individual layers of clear polyethylene sheeting, each at least 6 mil (0.15 mm) in thickness, turned up walls at least 12 inches (305 mm). Form a sharp right angle bend at junction of floor and wall so that there is no radius which 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.

GENERALLY CARPETING SHOULD BE REMOVED AND DISPOSED OF IN A SPACE WHICH CONTAINS FRIABLE ACM. USE LANGUAGE BELOW IF CARPETING IS TO BE SAVED. IF THERE IS NO CARPET DELETE FOLLOWING.

- c. Cover Carpeting with three (3) layers of polyethylene sheeting at least 6 mil (0.15 mm) in thickness. Place corrugated cardboard sheets between the top and middle layers of polyethylene.

THE FOLLOWING LANGUAGE SHOULD BE USED IF CARPETING HAS A PAD OR IS OTHERWISE THICK ENOUGH TO PROVIDE QUESTIONABLE FOOTING FOR SCAFFOLDING.

- d. Cover Sheet Plastic in areas where scaffolding is to be used with a single layer of ½ inch (13 mm) CDX plywood or 1/4 inch (6.5 mm) tempered hardboard. Wrap edges and corners of each sheet with duct tape. At completion of abatement work wrap plywood or hardboard with 2 layers of 6 mil (0.15 mm) polyethylene and move to next Work Area or dispose of as an asbestos-contaminated waste material in accordance with section 02084 of this specification.

THREE LAYERS OF 6 MIL (0.15 MM) PLASTIC SHOULD BE CONSIDERED IN AREAS WHERE PLASTIC MAY BE RIPPED, SUCH AS IN A REMOVAL WITH WIRE LATH OR WHERE ROOM FINISHES ARE DELICATE OR COSTLY.

- e. Cover all walls in Work Area including "Critical Barrier" sheet plastic barriers with one layer of polyethylene sheeting, at least 6 mil (0.15 mm) in thickness, mechanically supported and sealed with duct tape or spray-glue in the same manner as "Critical Barrier" sheet plastic barriers. Tape all joints including the joining with the floor covering with duct tape or as otherwise indicated on the Contract Documents or in writing by the Designer.

ELEVATORS AND STAIR TOWERS IN HIGH RISE BUILDINGS REQUIRE SPECIFICALLY DESIGNED POSITIVE PRESSURE AREAS TO OVERCOME THE STACK EFFECT WHICH WILL ATTEMPT TO DRAW AIR FROM FLOORS BELOW THE MIDLINE OF THE BUILDING AND DISCHARGE IT ON FLOOR ABOVE. STACK EFFECT RESULTS IN THE POSSIBILITY OF SPREADING AIRBORNE ASBESTOS FIBERS THROUGHOUT A BUILDING.

DELETE THE FOLLOWING IF THERE IS NO ELEVATOR ACCESS TO THE WORK AREA. AREA IN FRONT OF ELEVATOR DOORS SHOULD BE POSITIVELY PRESSURIZED TO PREVENT THE PISTON ACTION OF THE ELEVATOR FROM DRAWING CONTAMINATION FROM THE Work Area INTO THE ELEVATOR SHAFT.

- f. Elevator: Cover walls, floor and ceiling of elevator with 2 layers of 6 mil (0.15 mm) polyethylene. Arrange entry to Work Area so that elevator door is in a positively pressurized space outside the clean room of the decontamination unit. At completion of work clean elevator as set forth in Section 01711. Refer to Section 01013 Summary of the Work for additional requirements for protection of elevator.

SHEET POLYETHYLENE IS VERY SLIPPERY UNDERFOOT AND CAN PRESENT A CONSIDERABLE SLIPPING HAZARD. DELETE THE FOLLOWING IF THERE ARE NO STAIRS RAMPS OR LADDERS IN THE WORK AREA.

- g. Stairs and Ramps: Do not cover stairs or ramps with unsecured sheet plastic. Where stairs or ramps are covered with plastic, provide 3/4 inch (19.1 mm) exterior grade plywood treads securely held in place, over plastic. Do not cover rungs or rails with any type of protective materials.
- h. Repair of Damaged Polyethylene Sheeting: Remove and replace plastic sheeting which has been damaged by removal operations or where seal has failed allowing water to seep between layers. Remove affected sheeting and wipe down entire area. Install new sheet plastic only when area is completely dry.

AN ISOLATION AREA PROVIDES A BUFFER IF THERE IS A FAILURE OF WORK AREA ISOLATION. AN ISOLATION AREA IS APPROPRIATE WHEN ADJACENT SPACES HAVE A CRITICAL OCCUPANCY WHICH CANNOT BE INTERRUPTED.

THE LOCATION AND ARRANGEMENT OF ISOLATION AREAS SHOULD BE SHOWN ON THE PLANS.

3.10 ISOLATION AREA:

A. Maintain isolation areas between the Work Area and adjacent building area:

DELETE ITEMS FROM THE FOLLOWING LIST THAT ARE NOT NEEDED. EDIT TO SUIT PROJECT REQUIREMENTS. DELETE THE ENTIRE ARTICLE IF NO ISOLATION AREAS ARE REQUIRED.

1. In locations shown on the plans.
2. In unoccupied rooms located between Work Area and adjacent occupied portions of the building.
3. In locations where separation between Work Area and occupied portions of building is formed by sheet plastic and/or temporary barriers.
4. Floor below Work Area.

B. Form isolation area by controlling access to the space in the same manner as a Work Area. Physically isolate the space from the Work Area and adjacent areas. Accomplish physical isolation by:

FOLLOWING ARE EXAMPLES. EDIT TO SUIT PROJECT REQUIREMENTS.

1. Installing critical barriers in unoccupied space.
2. Erecting a second Critical Barrier a minimum of 3 feet (1.0 m) away from Work Area.

3.11 STOP WORK:

- A. **If the Critical or Primary barrier falls** or is breached in any manner stop asbestos removal work immediately and comply with “Stop Work” requirements of Section 01013 “Summary of Work - Asbestos Abatement”. Do not start work until authorized in writing by the Designer.

3.12 EXTENSION OF WORK AREA:

- A. **Extension of Work Area:** If the Critical Barrier is breached in any manner that could allow the passage of asbestos debris or airborne fibers, then add affected area to the Work Area, enclose it as required by this Section of the specification and decontaminate it as described in Section 01711 Project Decontamination.

3.13 SECONDARY BARRIER:

- A. **Secondary layer** of plastic as a drop cloth to protect the primary layer from debris generated by the asbestos abatement work is specified in the appropriate work sections.

FOLLOWING IS A CATCH-ALL. IT IS PREFERABLE TO DESIGN THE STRUCTURE AND SHOW IT ON THE DRAWINGS.

3.14 EXTERIOR ENCLOSURES:

- A. **Construct exterior enclosures** as a Critical Barrier as necessary to completely enclose the work. Fabricate from reinforced polyethylene sheeting and 2 inch x 4 inch (51mm X 102 mm) wood framework. Attach to existing building components or brace as necessary for lateral stability. Construct walls to meet all state and local regulations for construction of temporary buildings. Construct to resist a wind of 30 MPH (13.41 m/s), slope ceiling to permit drainage of rain water.

END OF SECTION - 01526

SECTION 01527 - REGULATED AREAS

GENERAL COMMENTS

This section describes the work necessary to set up a regulated area as a location for operations and maintenance work activities that disturb asbestos-containing materials to take place. It is intended to be used with several other sections to write specifications for O&M work that is going to be hired out to an asbestos abatement contractor rather than being performed by facility maintenance staff. O&M programs are frequently structured so that work that can be accomplished while avoiding ACM is carried out by facility staff, and work that actually disturbs ACM is contracted out. NIBS publishes a manual on the design of asbestos O&M programs and work practices: *GUIDANCE MANUAL, Asbestos Operations & Maintenance Work Practices*. Refer to the NIBS O&M Manual, the introduction, and the evaluation for section 02083 for more discussion on the design of asbestos O&M programs.

- **01528 Entry Into Controlled Areas:** Requirements for O&M activities such as entry into a space above a suspended ceiling where there is an asbestos-containing fireproofing are set forth in this section.
- **01560 Worker Protection - Repair and Maintenance:** describes the training, equipment and procedures necessary to protect workers against asbestos contamination and other work place hazards during maintenance activities. Respiratory protection is covered in the following section.
- **01562 Respiratory Protection:** Establishes procedures and equipment for adequate protection against inhalation of airborne asbestos fibers.
- **02083 Disturbance of ACM During O&M**
- **01046 Cutting and Patching - Asbestos-Containing Materials:** This section describes procedures to be used if asbestos-containing materials must be cut and patched.
- **01529 Mini-enclosures and Glovebags:** Control procedures for maintenance activities that involve the disturbance of small areas of asbestos-containing materials, but for which there is no negative exposure assessment, or that involve drilling, cutting, abrading, sanding, chipping, breaking or sawing of TSI or surfacing material are set forth in this section.
- **01712 Cleaning and Decontamination Procedures:** Sets forth procedures to clean up asbestos debris and dust, and procedures to decontaminate objects and rooms.
- **02084 Disposal of Asbestos-Containing Waste Material:** The requirements for the proper containing, transport and disposal of

Work: This section is used to specify the O&M work activities for which there is a negative exposure assessment, and the work is performed in the open. Work of this section is performed in a regulated area.

The following sections are also intended to be used in securing contractor services in support of an operations and maintenance program. The specifications of the contracted portion of a typical asbestos O&M program will probably include most or all of the following sections. These sections need to be combined with the administrative specification sections and the other parts of the contract. Refer to the introduction for more information on the administrative specification sections and the necessary parts necessary for a complete set of Contract Documents.

asbestos waste are set forth in this section.

- **Section 02085 Resilient Flooring Removal - Resilient Floor Covering Manufacturers' Recommended Non-Aggressive Work Practices:** This section describes the work practices for intact removal of resilient flooring, and the requirements for a negative exposure assessment for this sort of work. This section is written to be a "stand-alone" performance based specification for resilient flooring removal. It could be used to bid this

work separately from other O&M work. Revision would be required to make this section work with the other O&M sections. However, the necessary work practices can be excerpted from "Part 3- Execution" of this section and inserted in Section 02083.

- **15254 Repair of Insulation and Lagging:** Describes repair of insulation on pipes and other equipment using procedures that involve primarily bridging encapsulants and fabric reinforcing.

SECTION 01527 - REGULATED AREAS

A REGULATED AREA AS DESCRIBED IN THIS SECTIONS IS INTENDED TO DEMARCAT E AREAS WHERE CLASS II, AND III ASBESTOS WORK IS CONDUCTED FOR OPERATIONS AND MAINTENANCE (O&M) WORK, AND ANY ADJOINING AREA WHERE DEBRIS AND WASTE FROM SUCH ASBESTOS WORK ACCUMULATE. A REGULATED AREA AS DESCRIBED IN THIS SECTION WILL ONLY BE USED FOR WORK PRACTICES WHERE A NEGATIVE EXPOSURE ASSESSMENT HAS BEEN MADE. REFER TO THE NIBS PUBLICATION "GUIDANCE MANUAL - ASBESTOS OPERATIONS & MAINTENANCE WORK PRACTICES," FOR FURTHER GUIDANCE ON THIS TOPIC.

THIS SECTION IS NOT INTENDED FOR USE WITH SECTION 02085 "RESILIENT FLOORING REMOVAL - RESILIENT FLOOR COVERING MANUFACTURERS' RECOMMENDED WORK PRACTICES. SECTION 02085 IS SELF CONTAINED. THIS SECTION CONTAINS REQUIREMENTS THAT MAY BE IN CONFLICT WITH 02085

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to work of this section.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

SELECT EITHER THE REFERENCE ABOVE OR BELOW AND DELETE THE OTHER.

- A. **Worker Protection:** is specified in Section 01561 "Worker Protection - Repair and Maintenance".
- B. **Respiratory Protection:** is specified in Section 01562 "Respiratory Protection"

INCLUDE THE FOLLOWING IF A REMOTE SHOWER IS REQUIRED BY THE WORK. 01563 WILL REQUIRE SUBSTANTIAL REVISION TO BE APPROPRIATE FOR USE WITH THIS SECTION. REFER TO THE NIBS PUBLICATION "GUIDANCE MANUAL - ASBESTOS OPERATIONS & MAINTENANCE WORK PRACTICES," FOR FURTHER GUIDANCE ON THIS TOPIC.

- C. **Wet Decontamination Facilities:** are described in Section 01563 "Decontamination Units."

1.3 DESCRIPTION OF WORK:

PROCEDURES SET OUT IN THIS AND ACCOMPANYING SECTIONS, 01528, 01561, 01712, 02083 AND 15254 SHOULD BE USED TO SPECIFY PROCEDURES NEEDED TO SUPPORT REPAIR OR MAINTENANCE OF EXISTING BUILDING COMPONENTS. UNDER NO CIRCUMSTANCES SHOULD THESE SECTIONS BE USED TO SPECIFY DEDICATED PURPOSE REMOVAL OF ASBESTOS-CONTAINING MATERIALS.

SECTION 01529 "MINI-ENCLOSURES AND GLOVEBAGS" DESCRIBES THE REGULATED AREA REQUIRED FOR WORK FOR WHICH THERE IS NO NEGATIVE EXPOSURE ASSESSMENT OR THAT INVOLVES DRILLING, CUTTING, ABRADING, SANDING, CHIPPING, BREAKING, OR SAWING OF THERMAL SYSTEM INSULATION OR SURFACING MATERIAL .

- A.** Work of this section consists of preparing a Regulated Area for work of the following specification sections only. Do not use procedures set forth in this section in connection with any other work.
1. Section 01046 Cutting & Patching Asbestos Containing Materials
 2. Section 01528 Entry Into Controlled Areas
 3. Section 01529 Mini Enclosures and Glovebags
 4. Section 01712 Cleaning and Decontamination Procedures
 5. Section 02083 Disturbance of ACM During O&M Work

INCLUDE THE FOLLOWING REFERENCE TO SECTION 09251 ONLY IF THIS SECTION IS EDITED TO ALLOW ONLY OPERATIONS THAT DO NOT DIRECTLY DISTURB ACM.

6. Section 09251 Gypsum Drywall - Asbestos Enclosures
7. Section 15254 Repair of Insulation and Lagging

1.4 SUBMITTALS

- A. Before the Start of Work:** Submit the following to the Designer for review. Begin no work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use or final-but-restricted use.
1. HEPA Filtered Vacuum Cleaners: Submit product data.
 2. Signs: Submit samples of each type of sign to be used.
 3. Warning Tape: Submit samples.

PART 2 - EQUIPMENT

2.1 PRODUCTS

A. HEPA Filter Vacuum Cleaners:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

RETAIN ABOVE FOR NONPROPRIETARY OR BELOW FOR SEMI-PROPRIETARY SPECIFICATION. REFER TO DIVISION-1 SECTION "PRODUCTS AND SUBSTITUTIONS." ABOVE IS THE CURRENT LANGUAGE REPLACING FORMER "OR EQUAL" CLAUSES.

2. Manufacturer: Subject to compliance with requirements, provide products of one of the Following:

THE FOLLOWING IS A LIST OF FIRMS BELIEVED TO MANUFACTURE THIS PRODUCT. NO MANUFACTURERS HAVE BEEN KNOWINGLY EXCLUDED AND NO ATTEMPT HAS BEEN MADE TO EVALUATE THESE PRODUCTS. ADDITIONAL SUPPLIERS MAY EXIST. PRODUCT LITERATURE SHOULD BE USED TO EVALUATE THESE PRODUCTS AND TO VERIFY THAT LISTED PRODUCTS COMPLY WITH THE SPECIFICATIONS AND MEET PROJECT REQUIREMENTS. VERIFY THAT PRODUCTS INDICATED ARE STILL BEING MANUFACTURED. EDIT OR ADD TO THE LIST AS APPROPRIATE TO THE PROJECT REQUIREMENTS. THIS LIST IS BEING REVISED.

Nilfisk of America, Inc. 225 Great Valley Parkway Malvern, PA 19355 (800) 645-3475	HEPA filtered Vacuums
Minuteman International 111 South Route 53 Addison, IL 60101 (708) 627-6900	Minuteman HEPA Vacuums
Pullman-Holt (White) Corp. PO Box 16647 Tampa, FL 33617 (813) 645-3475	HEPA Filtered Vacuums

B. Plastic Sheet:

1. Plastic Sheet: A single polyethylene film in the largest sheet size possible to minimize seams, 6.0 mil (0.15 mm) thick, clear, frosted, or black as indicated.

PART 3 - EXECUTION

3.1 SECURING WORK AREA:

- A. **Secure work** area from access by occupants, staff or users of the building. Accomplish this where possible, by locking doors, windows, or other means of access to the area, by scheduling work for periods of time that the building is unoccupied, or by constructing temporary wood stud and plywood barriers.

3.2 DEMARCATION OF REGULATED AREA:

THIS ARTICLE DOES NOT APPLY TO THE REMOVAL OF RESILIENT FLOORING MATERIALS. REFER TO SECTION 02085 "RESILIENT FLOORING REMOVAL - RESILIENT FLOOR COVERING MANUFACTURERS' RECOMMENDED WORK PRACTICES. SECTION 02085 IS SELF CONTAINED.

- A. **Demarcation.** Demarcate the Regulated Area with a sheet plastic drop cloth, signs and barrier tape. Configure the regulated area in a manner that minimizes the number of persons within the area and protects persons outside the area from exposure to airborne concentrations of asbestos.
 - 1. **Drop Cloth:** Cover floor in vicinity of Work Area and six (6) feet (1.82 meters) beyond, with 6 mil (0.15 mm) polyethylene drop sheet. Where work is adjacent to wall, extend drop sheet up wall and secure at ceiling with duct tape. This drop sheet demarcates the boundary of the Regulated Area.

REVISE BELOW AS REQUIRED BY LOCAL REQUIREMENTS

- 2. **Signs:** Post warning signs that carry the following legends in both English and Spanish:
 - a. **First Sign:** Provide warning signs at each locked door leading to the controlled area reading as follows:

Legend	Notation
KEEP OUT	3 inch (76.2 mm)Block

- b. **Second Sign:** Immediately inside the locked door and outside the controlled area post an approximately 20 inch by 14 inch (508 mm x 356 mm) manufactured caution sign displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926:

THE FOLLOWING IS THE STANDARD COMMERCIALY AVAILABLE ASBESTOS WARNING SIGN. OSHA REQUIRES WARNING SIGNS TO BE COMPREHENSIBLE TO NON-ENGLISH SPEAKING WORKERS. RESPIRATORS ARE REQUIRED FOR WORK THAT DISTURBS THERMAL SYSTEM INSULATION OR SURFACING MATERIAL EVEN IF THERE IS A NEGATIVE EXPOSURE ASSESSMENT.

Legend:

DANGER

ASBESTOS

CANCER AND LUNG DISEASE HAZARD

AUTHORIZED PERSONNEL ONLY

RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

EDIT BELOW BASED UPON SPECIFIC WIDTH AND TEXT AVAILABLE.

3. Barrier Tape: Where the controlled area is in a large area such as on part of a boiler room or open office area, delineate area with 3 inch (76.2 mm) wide polyethylene ribbon with the printed warning, "CAUTION ASBESTOS REMOVAL". Install this ribbon at between 3 and 4 feet (0.91 and 1.22 meters) above the floor.

3.3 SCHEDULING:

- A. **Work may be carried out** during normal working hours in those areas which can be completely secured by lockable doors from access by building occupants and staff, and which have HVAC equipment that can be shut down and locked off. Otherwise, work is to be carried out after building occupants and cleaning staff have left.

3.4 GENERAL PROCEDURES:

THIS ARTICLE DOES NOT APPLY TO THE REMOVAL OF RESILIENT FLOORING MATERIALS. REFER TO SECTION 02085 "RESILIENT FLOORING REMOVAL - RESILIENT FLOOR COVERING MANUFACTURERS' RECOMMENDED WORK PRACTICES. SECTION 02085 IS SELF CONTAINED.

- A. **The following precautions and procedures** have application to work of this section. Workers must exercise caution to avoid release of asbestos fibers into the air:
 1. Setup and management of the controlled area is to be under the supervision of a OSHA Competent Person as described in Section 01043 Project Coordination - Asbestos Abatement
 2. Before start of work comply with requirement for worker protection in section 01561, and respiratory protection in section 01562.

3. Do not allow eating, drinking, smoking, chewing tobacco or gum, or applying cosmetics in the Regulated Area.
4. Shut down any air handling equipment bringing air into or out of the Regulated Area.
5. Clean any existing dust or debris from the floor and walls, and other surface in the immediate location of the work prior to commencing work by damp-mopping or by use of a High Efficiency Particulate Air (HEPA) filtered vacuum.
6. Cover floor in vicinity of Work Area and six (6) feet (1.82 meters) beyond, with 6 mil (0.15 mm) polyethylene drop sheet. Where work is adjacent to wall, extend drop sheet up wall and secure at ceiling with duct tape. This drop sheet demarcates the boundary of the Regulated Area.
7. Seal all openings, supply and exhaust vents, and convectors within ten (10) feet (3.05 meters) of the Work Area with 6 mil (0.15 mm) polyethylene sheeting secured and completely sealed with duct tape.
8. Perform the work per the appropriate specification section while on plastic drop sheet.
9. Immediately remove any asbestos-containing debris which collects on the drop sheet either by using a HEPA vacuum or by spraying with amended water or removal encapsulant, collecting with wet paper towels, placing in a disposal bag while still wet, and cleaning surface of plastic sheet with wet paper towels.
10. Complete the following at completion of work in an area before stepping off drop sheet
 - a. While standing on plastic sheet thoroughly HEPA vacuum ladder and any tools used and pass to worker standing off sheet.
 - b. Worker standing off the sheet HEPA vacuum thoroughly the worker standing on the sheet.
 - c. Worker on the sheet thoroughly HEPA vacuum all surfaces of the plastic sheet, bags, and any other items on the sheet including the worker's feet.
11. If moving to the next Work Area in the same secured area: Worker on the drop sheet is to don clean foot covers, placing each foot, in turn, off the sheet as the foot cover is put on. Remove clean foot covers at the next Work Area while standing on the sheet. Dispose of the used foot covers along with the plastic sheet at completion of work in that area. Do not reuse foot covers to move off the sheet.

12. If work day is complete or if next Work Area is in another secured area: all workers remove paper suits turning them inside out while doing so. The person on the sheet steps with each foot off the sheet as the foot covers are removed.
13. Fold sheet and all its contents toward the center.
14. Place the sheet in a properly labeled disposal bag.
15. Neck down the bag and collapse it with the HEPA vacuum.
16. Twist the bag shut, bend over and seal with duct tape by wrapping around bag neck at least 3 times.
17. Clean all surfaces of the Work Area by use of a HEPA filter vacuum until no visible residue remains.

USE FOLLOWING TWO PARAGRAPHS IF WORK INVOLVED WILL NOT RESULT IN CONTAMINATION OF WORKERS CLOTHES OR AIRBORNE FIBER CONCENTRATIONS ABOVE BUILDING BACKGROUND LEVELS. IF A WORKER'S CLOTHING BECOMES CONTAMINATED OR AIRBORNE ASBESTOS CONCENTRATIONS ABOVE BUILDING BACKGROUND ARE EXPERIENCED DELETE THE FOLLOWING TWO PARAGRAPHS AND USE THE PARAGRAPH REQUIRING A WET DECONTAMINATION.

- B. **At completion of work** require all workers to complete decontamination procedures in accordance with Section 01561 Worker Protection - Repair & Maintenance.
- C. **Remove respirators** using the procedure in Section 01561 Worker Protection - Repair & Maintenance.

IF OPERATION MAY RESULT IN CONTAMINATION OF WORKER CLOTHING OR AIRBORNE ASBESTOS CONCENTRATIONS ABOVE BUILDING BACKGROUND RETAIN THE PARAGRAPH BELOW, REQUIRING A WET DECONTAMINATION, AND DELETE THE TWO ABOVE.

- D. **At completion of work** require all workers to complete wet decontamination procedures in accordance with Section 01560 Worker Protection - Asbestos-Abatement.

END OF SECTION - 01527

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SECTION 01528 - ENTRY INTO CONTROLLED AREAS

GENERAL COMMENTS

This section describes the requirements for entry into a controlled area such as the space above a suspended ceiling where there is an asbestos-containing fireproofing. This allows access to perform operations and maintenance work activities in the controlled space. Some of these activities could disturb asbestos-containing materials, and there are separate specifications for that work. It is intended to be used with several other sections to write specifications for O&M work that is going to be hired out to an asbestos abatement contractor rather than being performed by facility maintenance staff. O&M programs are frequently structured so that work that can be accomplished while avoiding ACM is carried out by facility staff, and work that actually disturbs ACM is contracted out. NIBS publishes a manual on the design of asbestos O&M programs and work practices: *GUIDANCE MANUAL, Asbestos Operations & Maintenance Work Practices*. Refer to the NIBS O&M Manual, the introduction, and the evaluation for section 02083 for more discussion on the design of asbestos O&M programs.

- **01527 Regulated Areas:** This section provides the language for specifying the set up of a regulated area, as required by OSHA, in the area in which operations and maintenance work is to take place.
- **01560 Worker Protection - Repair and Maintenance:** describes the training, equipment and procedures necessary to protect workers against asbestos contamination and other work place hazards during maintenance activities. Respiratory protection is covered in the following section.
- **01562 Respiratory Protection:** Establishes procedures and equipment for adequate protection against inhalation of airborne asbestos fibers.
- **02083 Disturbance of ACM During O&M**

Work: This section is used to specify the O&M work activities for which there is a negative exposure assessment, and the work is performed in the open. Work of this section is performed in a regulated area.

- **01529 Mini-enclosures and Glovebags:** Control procedures for maintenance activities that involve the disturbance of small areas of asbestos-containing materials, but for which there is no negative exposure assessment, or that involve drilling, cutting, abrading, sanding, chipping, breaking or sawing of TSI or surfacing material are set forth in this section.

The following sections are also intended to be used in securing contractor services in support of an operations and maintenance program. The specifications of the contracted portion of a typical asbestos O&M program will probably include most or all of the following sections. These sections need to be combined with the administrative specification sections and the other parts of the contract. Refer to the introduction for more information on the administrative specification sections and the necessary parts necessary for a complete set of Contract Documents.

- **01046 Cutting and Patching - Asbestos-Containing Materials:** This section describes procedures to be used if asbestos-containing materials must be cut and patched.
- **01712 Cleaning and Decontamination Procedures:** Sets forth procedures to clean up asbestos debris and dust, and procedures to decontaminate objects and rooms.
- **02084 Disposal of Asbestos-Containing Waste Material:** The requirements for the

proper containing, transport and disposal of asbestos waste are set forth in this section.

- **Section 02085 Resilient Flooring Removal - Resilient Floor Covering Manufacturers' Recommended Non-Aggressive Work Practices:** This section describes the work practices for intact removal of resilient flooring, and the requirements for a negative exposure assessment for this sort of work. This section is written to be a "stand-alone" performance based specification for resilient flooring removal. It could be used to bid this

work separately from other O&M work. Revision would be required to make this section work with the other O&M sections. However, the necessary work practices can be excerpted from "Part 3- Execution" of this section and inserted in Section 02083.

- **15254 Repair of Insulation and Lagging:** Describes repair of insulation on pipes and other equipment using procedures that involve primarily bridging encapsulants and fabric reinforcing.

SECTION 01528 - ENTRY INTO CONTROLLED AREAS

THIS SECTION DESCRIBES PROCEDURES TO BE USED DURING THE COURSE OF AN OPERATIONS & MAINTENANCE PROGRAM. THESE ARE OPEN WORK PROCEDURES THAT SHOULD ONLY BE USED IF ALL OF THE FOLLOWING CONDITIONS ARE MET:

1. A NEGATIVE EXPOSURE ASSESSMENT HAS BEEN ESTABLISHED
2. TSI OR SURFACING ACM IS NOT CUT, DRILLED, SANDED, CHIPPED, ETC.
3. ACTUAL EXPOSURES ARE BELOW THE PEL

REFER TO APPENDIX A IN THE INTRODUCTION FOR A DISCUSSION ON NEGATIVE EXPOSURE ASSESSMENT, INITIAL AND PERIODIC EXPOSURE MONITORING,

REFER TO THE NIBS PUBLICATION "GUIDANCE MANUAL - ASBESTOS OPERATIONS & MAINTENANCE WORK PRACTICES" FOR A DESCRIPTION OF THE STEPS NECESSARY TO SET UP AN O&M PROGRAM.

PART 1 GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract**, including General and Supplementary Conditions and other Division - 1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. The provisions of this section apply** when entry is required into an area where such entry could cause contamination of portions of the building and/or where respiratory or other worker protection measures are required.
- B. Unless authorized in writing** by the Designer, the provisions of this section apply to only the following situations:

THIS SECTION SHOULD BE USED AS A MEANS TO ALLOW ACCESS FOR REPAIR AND MAINTENANCE ONLY. THIS INCLUDES ALLOWING ACCESS TO CEILINGS. REMOVAL OF CEILINGS AS PART OF THE WORK OF AN ABATEMENT PROJECT IS BEYOND THE SCOPE OF THE PROCEDURES SPECIFIED IN THIS SECTION.

THE FOLLOWING ARE TYPICAL OF THE TYPES OF SITUATIONS COVERED BY THIS SECTION. DELETE IF NOT REQUIRED AND EDIT FOR SPECIFIC PROJECT REQUIREMENTS.

1. Entry into the space above a suspended ceiling where there is exposed friable asbestos-containing fire proofing, visible asbestos-containing debris, or other friable asbestos-containing surfacing material when the ceiling tiles in an area no greater than 6 feet by 12 feet (1.83 x 3.66 meters) area to be removed.

- 2. Entry through sealed access (access door, hatchway, locked door) into an area with friable asbestos-containing surfacing materials or visible debris.

USE OF THIS SECTION IS APPROPRIATE ONLY IF THERE HAS BEEN A NEGATIVE EXPOSURE ASSESSMENT AS REQUIRED BY OSHA, AND THE AIRBORNE FIBER LEVELS DO NOT EXCEED THE EPA PCM CLEARANCE LEVEL. THIS ASSURES THAT BOTH WORKERS AND BUILDING OCCUPANTS WILL BE PROTECTED. THE FOLLOWING PARAGRAPH REQUIRES THE SUBMISSION OF DATA DEMONSTRATING THE CONTRACTOR'S ABILITY TO PERFORM THE WORK WITHIN THESE LIMITS.

- C. **Worker Protection:** Use procedures of this section only where a negative exposure assessment has been made for these procedures. Historic airborne fiber data demonstrate that personal airborne fiber counts in the breathing zone of those performing the work can be continuously maintained at less than 0.1 fibers per cubic centimeter can be used as a part of this assessment.
- D. **Area Protection:** Use procedures of this section only where historic airborne fiber data demonstrate that area samples in the work area can be continuously maintained at less than 0.01 fibers per cubic centimeter.

1.3 SUBMITTALS:

THE PROCEDURES CONNECTED WITH THIS SECTION ARE PREDOMINANTLY OPEN WORK PROCEDURES THAT DO NOT ELEVATE AIRBORNE FIBER LEVELS. THIS CANNOT SIMPLY BE PRESUMED. AIRBORNE FIBER LEVELS GENERATED BY THE WORK MUST BE MEASURED AND FOUND TO BE WITHIN THE FOLLOWING BOUNDS.

- A. **Before the Start of Work:** Submit the following to the Designer for review. Begin no work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use or final-but-restricted use.
 - 1. Historic Airborne Fiber Data: Submit airborne asbestos fiber count data from an independent air monitoring firm to demonstrate:

IF THE FOLLOWING IS EXCEEDED THEN THE WORK TRIGGERS THE OSHA REQUIREMENT FOR ENCLOSURE

- a. The ability to perform work of this section while maintaining an airborne fiber count below 0.1 fibers per cubic centimeter in the breathing zone of the individual performing the work.

IF THE FOLLOWING IS EXCEEDED THEN THERE EXISTS A POSSIBILITY THAT THE SPACE HAS BEEN CONTAMINATED. IF THIS WERE TO OCCUR THEN THE SPACE WOULD REQUIRE A DECONTAMINATION.

- b. The ability to perform work of this section while maintaining an airborne fiber count below 0.01 fibers per cubic centimeter in the work area.
- 2. Include the following data for each procedure required by the work:
 - a. Date of measurements

- b. Operations monitored
- c. Sampling and analytical methods used and evidence of their accuracy
- d. Number, duration, and results of samples taken

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 REGULATED AREA:

- A. **Prior to beginning work** in this area establish a regulated area as described in Section 01527 Regulated Areas.

3.2 ACCESS THROUGH SUSPENDED CEILINGS:

- A. **Remove acoustical panels** from ceiling suspension system using the following sequence:

REVISE THE FOLLOWING TO REQUIRE A WET DECONTAMINATION IF PERSONAL SAMPLING DURING INITIAL MONITORING INDICATES THAT AIRBORNE FIBER LEVELS ARE ELEVATED DURING THE ACTIVITY.

- 1. Follow worker protection procedures including disposable coveralls and respirators required by Section 01560, and Section 01562.
- 2. Follow local area protection procedures of Section 01528. Spread layer of 6 mil (0.15 mm) polyethylene sheet on floor 6 feet (1.83 meters) further in extent than the size of the ceiling opening to be made.

THE ABOVE THREE SUBPARAGRAPHS REQUIRE AMPLIFICATION IF SECTION 01561, 01562, 01527 ARE NOT INCLUDED IN SPECIFICATION.

- 3. HEPA vacuum around edges of all panels to be removed.
- 4. While holding nozzle of HEPA vacuum in vicinity slowly lift one edge of center ceiling panel. Immediately HEPA vacuum space at lifted edge. Lift entire panel straight up and HEPA vacuum all four sides.
- 5. Place panel on top of adjacent ceiling.

THE FOLLOWING IS GOOD PRACTICE. IF A SMALL (UNDER 1000 CFM) HEPA FILTERED FAN UNIT IS AVAILABLE.

6. Place intake duct to HEPA Filtered Fan Unit per Section 01513 in space above ceiling and fasten in place. Operate machine continuously while ceiling is open.
7. Note that the operation of the HEPA vacuum is intended to clean the air in the location of the work. As such the nozzle should be kept above the ceiling as much as possible and the canister on the floor.
8. Climb to a position which permits access to the top of the ceiling adjacent to the removed panel.
9. Working in the space above the ceiling, HEPA vacuum both sides of the ceiling panel first removed and hand it down into a 6 mil (0.15 mm) polyethylene bag for storage.
10. Remove loose material hanging from the friable asbestos- containing material with the suction from the HEPA vacuum.

REVISE ABOVE AS NECESSARY. PROCEDURES SHOULD ALWAYS WORK FROM HIGH TO LOW SO THAT SETTLING FIBERS ARE COLLECTED.

11. Pass wand of operating HEPA vacuum through air between asbestos-containing material and top of ceiling.
12. HEPA vacuum the tops of all ceiling panels which are in reach.
13. Carefully HEPA vacuum the crack between the suspension system and ceiling panels from the top for all ceiling panels within reach.
14. Remove ceiling panels as required while constantly HEPA vacuuming all four edges of panel and suspension system.
15. Working in space above ceiling HEPA vacuum both sides on each panel removed and hand each down into a 6 mil (0.15 mm) polyethylene bag which is labeled as set forth in Section 02084.

NOTE THAT THE ABOVE LANGUAGE WILL REQUIRE EDITING IF SECTION 02084 IS DELETED FROM THE SPECIFICATION.

16. Maintain HEPA vacuum in operation with nozzle above ceiling and exhaust at floor for the entire time that the ceiling is open and work is being done above the ceiling.
17. When above-ceiling work is complete replace ceiling panels.
18. HEPA vacuum worker's head, arm, and shoulders before climbing down from ceiling.
19. HEPA vacuum ladder while climbing down.

- 20. While standing on plastic sheet thoroughly HEPA vacuum ladder and pass it to person standing off sheet.

3.3 ENTRY INTO CONTROLLED AREAS:

- A. Use same procedure as above except that ceiling tiles do not need to be removed.
- B. If access is through a wall hatch or door, duct tape floor sheet to wall or threshold.
- C. If access is into large area such as crawl tunnel, comply with worker protection requirements but use HEPA vacuum only for work procedures in the area.

3.4 PERSONNEL DECONTAMINATION:

USE THE FOLLOWING LANGUAGE UNLESS INITIAL MONITORING DEMONSTRATES THAT THE WORK PROCEDURES USED DO NOT RESULT IN AIRBORNE ASBESTOS CONCENTRATIONS ABOVE BUILDING BACKGROUND.

- A. At the end of all work change to a clean disposable coverall and leaving respirator in place proceed to a remote shower and decontaminate as required by Section 01560 Worker Protection - Asbestos Abatement.

USE THE PARAGRAPH BELOW AND DELETE THE ABOVE IF INITIAL MONITORING DEMONSTRATES THAT WORKERS WILL NOT EXPERIENCE EITHER AIRBORNE ASBESTOS CONCENTRATIONS ABOVE BUILDING BACKGROUND OR DIRECT CONTAMINATION OF CLOTHING.

- B. Complete dry decontamination procedures set forth in Section 01561 “Worker Protection - Repair & Maintenance.”

END OF SECTION - 01528

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SECTION 01529 - MINI-ENCLOSURES AND GLOVEBAGS

GENERAL COMMENTS

This section describes the requirements for maintenance activities that involve the disturbance of small areas of asbestos-containing materials (i.e., no more than can be contained in one standard (60 inch x 60 inch) glove or waste bag) but for which there is no negative exposure assessment, or that involve drilling, cutting, abrading, sanding, chipping, breaking or sawing of TSI or surfacing material. Work in this section is contained inside of a mini-enclosure or a glovebag. This section is intended to be used with several other sections to write specifications for O&M work that is going to be hired out to an asbestos abatement contractor rather than being performed by facility maintenance staff. O&M programs are frequently structured so that work that can be accomplished while avoiding ACM is carried out by facility staff, and work that actually disturbs ACM is contracted out. NIBS publishes a manual on the design of asbestos O&M programs and work practices: *GUIDANCE MANUAL, Asbestos Operations & Maintenance Work Practices*. Refer to the NIBS O&M Manual, the introduction, and the evaluation for section 02083 for more discussion on the design of asbestos O&M programs.

Section 01529 is used to specify work activities that occur in a regulated area and after the work area has been accessed. It needs to be used with the following sections to form a complete specification for the work.

- **01527 Regulated Areas:** This section provides the language for specifying the set up of a regulated area, as required by OSHA, in the area in which operations and maintenance work is to take place.
- **01528 Entry Into Controlled Areas:**

Requirements for O&M activities such as entry into a space above a suspended ceiling where there is an asbestos-containing fireproofing are set forth in this section.

- **01560 Worker Protection - Repair and Maintenance:** describes the training, equipment and procedures necessary to protect workers against asbestos contamination and other work place hazards during maintenance activities. Respiratory protection is covered in the following section.
- **01562 Respiratory Protection:** Establishes procedures and equipment for adequate protection against inhalation of airborne asbestos fibers.
- **02083 Disturbance of ACM During O&M Work:** This section is used to specify the O&M work activities for which there is a negative exposure assessment, and the work is performed in the open. However, the work practices in this section are designed to minimize airborne fiber release during the work. Use of the work practices from this section inside of mini-enclosures will help to reduce the airborne fibre levels that workers are exposed to, and that may escape from the enclosure into the building environment. In any case, work of this section needs to be performed in a regulated area.

The following sections are also intended to be used in securing contractor services in support of an operations and maintenance program. The specifications of the contracted portion of a typical asbestos O&M program will probably include most or all of the following sections. These sections need to be combined with the administrative specification sections and the other parts of the contract. Refer to the introduction for

more information on the administrative specification sections and the necessary parts necessary for a complete set of Contract Documents.

- **01046 Cutting and Patching - Asbestos-Containing Materials:** This section describes procedures to be used if asbestos-containing materials must be cut and patched.
- **01712 Cleaning and Decontamination Procedures:** Sets forth procedures to clean up asbestos debris and dust, and procedures to decontaminate objects and rooms.
- **02084 Disposal of Asbestos-Containing Waste Material:** The requirements for the proper containing, transport and disposal of asbestos waste are set forth in this section.
- **Section 02085 Resilient Flooring Removal - Resilient Floor Covering Manufacturers'**

Recommended Non-Aggressive Work

Practices: This section describes the work practices for intact removal of resilient flooring, and the requirements for a negative exposure assessment for this sort of work. This section is written to be a "stand-alone" performance based specification for resilient flooring removal. It could be used to bid this work separately from other O&M work. Revision would be required to make this section work with the other O&M sections. However, the necessary work practices can be excerpted from "Part 3- Execution" of this section and inserted in Section 02083.

- **15254 Repair of Insulation and Lagging:** Describes repair of insulation on pipes and other equipment using procedures that involve primarily bridging encapsulants and fabric reinforcing.

SECTION 01529 - MINI ENCLOSURES AND GLOVEBAGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract**, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF THE WORK:

PROCEDURES SET OUT IN THIS AND ACCOMPANYING SECTIONS, 01528, 01561, 01712, 02083 AND 15254 SHOULD BE USED TO SPECIFY PROCEDURES NEEDED TO SUPPORT REPAIR OR MAINTENANCE OF EXISTING BUILDING COMPONENTS. UNDER NO CIRCUMSTANCES SHOULD THESE SECTIONS BE USED TO SPECIFY DEDICATED PURPOSE REMOVAL OF ASBESTOS-CONTAINING MATERIALS (ACM).

- A. Work of this section** consists of preparing a Regulated Area for work for which there is no negative exposure assessment or that involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of thermal system insulation or surfacing material. This is Class III OSHA work, and is limited in size to operations that generate small amounts of ACM, i.e., no more than can be contained in one standard (60 inch x 60 inch) glove or waste bag filled no more than 1/3 to 1/2 full.

1.3 SUBMITTALS:

- A. Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal is returned for unrestricted use.
 - 1. Surfactant:** Submit product data, use instructions and recommendations from manufacturer of surfactant intended for use. Include data substantiating that material complies with requirements.
 - 2. Removal Encapsulant:** Submit product data, use instructions and recommendations from manufacturer of removal encapsulant intended for use. Include data substantiating that material complies with requirements.
 - 3. NESHAP Certification:** Submit certification from manufacturer of surfactant or removal encapsulant that, to the extent required by this specification, the material, if used in accordance with manufacturer's instructions, will wet ACM to which it is applied as required by the National Emission Standard for Hazardous Pollutants (NESHAP) Asbestos Regulations (40 CFR 61, Subpart M).

4. Material Safety Data Sheet: Submit Material Safety Data Sheet, or equivalent, in accordance with the OSHA Hazard Communications Standard (29 CFR 1910.1200) for each surfactant and encapsulating material proposed for used. Submit in the same manner as product data. Submittal is for information purposes only. Submittal will not be reviewed by Designer.
 5. Spray Cement: Submit following:
 - a. Product description including major components and solvents
 - b. Manufacturer's installation instructions. Indicate portions applicable to the project
 6. Sheet Plastic: For fire retardant plastic submit test reports on NFPA 701 test.
 7. Glovebags: Submit product data.
 8. HEPA Vacuums: Submit product data
 9. Signs: Submit samples of signs to be used.
 10. Mini-enclosure: Provide shop drawing of mini-enclosure arrangement to used.
- B. Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal has been 'Received - Not Reviewed.'
1. Material Safety Data Sheet: Submit Material Safety Data Sheets, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for the following:
 - a. Surfactants.
 - b. Spray Cement.
 - c. Encapsulants.

PART 2 - PRODUCTS

2.1 GLOVE BAGS:

EDIT THE FOLLOWING LIST TO ELIMINATE THOSE TYPES OF ENCLOSURES NOT USED.
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- A. **Glovebags:** Provide minimum 6 mil (0.15 mm) thick polyethylene, polyvinyl chloride or equivalent plastic sack, with a seamless bottom, and two sealed inward projecting long sleeved gloves or mittens, preprinted with same warning notice as a disposal bag, equipped with a pouch for storage of tools, with designated location for wand or HEPA vacuum wand. Glove bag is to be not more than 60 inches by 60 inches in size.

- B. **Negative Pressure Glove Bag Systems:** Provide glovebags as specified above that are equipped for attachment to a HEPA vacuum, and that has a device to prevent the bag from collapsing during use.

- C. **Negative Pressure Glove Box Systems:** Provide glove boxes constructed with rigid sides and made from metal or other material, equipped for attachment to a HEPA vacuum, which will not collapse during use, and which can withstand the weight of the ACM and water used during removal. Provide system equipped with:
 - 1. An air filtration unit attached to the box
 - 2. The box fitted with gloved apertures
 - 3. An aperture at the base of the box to serve as a bagging outlet for waste ACM and water
 - 4. Provide waste bags made of 6 mil (0.15 mm) thick plastic labeled as set forth in section 02084 "Disposal of Regulated Asbestos-Containing Material".
 - 5. A HEPA filtration system (or HEPA vacuum) to maintain pressure barrier in box.

2.2 SHEET PLASTIC:

EDIT THE FOLLOWING LIST TO ELIMINATE THOSE TYPES OF PLASTIC NOT USED.

FOLLOWING IS MOST LIKELY TO BE FOUND ON THE JOB IN THE ABSENCE OF A MORE SPECIFIC REQUIREMENT.

- A. **Polyethylene Sheet:** A single polyethylene film in the largest sheet size possible to minimize seams, 6.0 mil (0.15 mm) thick , clear, frosted, or black as indicated.

FOLLOWING IS A GOOD GENERAL PRECAUTION AND SHOULD ALWAYS BE USED IN AREAS WHERE THERE COULD BE EXITING DIFFICULTIES IN CASE OF EMERGENCY (WORK AREAS ABOVE OR BELOW GRADE OR INTERIOR SPACES WITH LIMITED EXITS) OR THERE IS HOT EQUIPMENT OR A POTENTIAL FOR FIRE, SUCH AS IN A BOILER ROOM. FIRE RETARDANT SHEET PLASTIC IS CONSIDERABLY MORE EXPENSIVE THAN STANDARD PLASTIC.

- B. **Polyethylene Sheet:** Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick , frosted or black as indicated.

REINFORCED PLASTIC SHOULD BE USED IN EXTERIOR APPLICATIONS WHERE THE SHEET IS EXPECTED TO BE STRESSED BY WINDS OR IN ANY LOCATION WHERE HIGH SKIN STRENGTH IS REQUIRED. FOLLOWING IS AN EXAMPLE OF LANGUAGE WHICH CAN BE USED. EDIT TO SUIT PROJECT REQUIREMENTS.

- C. Reinforced Polyethylene Sheet:** Where plastic sheet constitutes the only barrier between the Work Area and the building exterior, provide translucent, nylon reinforced or woven polyethylene, laminated, flame resistant, polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick, frosted or black as indicated.

2.3 MISCELLANEOUS MATERIALS:

- A. Duct Tape:** Provide duct tape in 2 inch or 3 inch (51 mm or 76 mm) widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
- B. Spray Cement:** Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

FOLLOWING ALLOWS THE CONTRACTOR TO USE EITHER A SURFACTANT IN WATER OR A REMOVAL ENCAPSULANT, PROVIDING THAT IT IS ABLE TO PERFORM AS WELL AS THE GENERIC MIXTURE OF 50% POLYOXYETHYLENE ESTER AND 50% POLYOXYETHYLENE ETHER.

- C. Wetting Materials:** For wetting prior to disturbance of ACM use either amended water or a removal encapsulant:
1. Amended Water: Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the ACM and retardation of fiber release during disturbance of the material equal to or greater than that provided by water amended with a surfactant consisting of one ounce of a solution of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.
 2. Removal Encapsulant: Provide a penetrating type encapsulant designed specifically for removal of ACM. Use a material which results in wetting of the ACM and retardation of fiber release during disturbance of the material equal to or greater than that provided by water amended with a surfactant consisting of one ounce of a solution of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.
- D. Encapsulants** are specified in Section 09805.

- E. **Garden Sprayer:** Provide a hand pump type pressure-can garden sprayer fabricated out of either metal or plastic, equipped with a metal wand at the end of a hose that can deliver a stream or spray of liquid under pressure.

PART 3 - EXECUTION

3.1 GENERAL:

- A. **Before Start of Work:** Complete the following before start of work of this section:
1. 01527 Regulated Areas

3.2 WORKER PROTECTION:

- A. Before beginning work with any material for which a Material Safety Data Sheet has been submitted provide workers with the required protective equipment. Require that appropriate protective equipment be used at all times.

3.3 GLOVE BAGS AND BOXES:

- A. **Complete requirements** of the following:
1. 01562 Respiratory Protection
 2. 01561 Worker Protection - Repair and Maintenance

THE FOLLOWING GLOVEBAG PROCEDURE CAN ONLY BE USED FOR STRAIGHT RUNS OF PIPING AND ELBOWS. ITS USE SHOULD BE LIMITED TO OSHA SUGGESTED APPLICATIONS. IF A MORE COMPLEX SITUATION EXISTS AN ALTERNATIVE ENCLOSURE SYSTEM WILL BE NEEDED.

- B. **Glovebag:** Remove ACM inside a glove bag according to the following procedure:
1. Use at least two persons to perform glovebag removals operations.
 2. Use each glovebag only once
 3. Do not move glovebag once it has been mounted in place.
 4. Do not use glovebag on surface whose temperature exceeds 150°F (65.6°C).

5. Check materials adjacent to locations where glovebag will be installed. Wrap damaged (broken lagging, hanging, etc.), loose or friable material in 2 layers of 6 mil (0.15 mm) plastic and "candy-stripe" with duct tape, or render material intact by some other method. Place one layer of duct tape around undamaged pipe at each location where the glove bag will be attached.
6. Slit top of the glove bag open (if necessary) and cut down the sides to accommodate the size of the pipe (about two inches longer than the pipe diameter) and allow additional so that the top of the glove bag will be clear of the pipe after installation.
7. Place necessary tools into pouch located inside glove bag. This will usually include: bone saw, utility knife, rags, scrub brush, wire cutters, tin snips and pre-wetted cloth.
8. Place a strip of duct tape along both edges of the open top slit of glove bag for reinforcement.
9. Place the glove bag around section of pipe to be worked on and staple top together through reinforcing duct tape. Staple down sides approximately 6 inches so that top of the glove bag is clear of pipe. Seal top and sides with duct tape. Next, duct tape the ends of glove bag to pipe itself, where previously covered with plastic or duct tape.
10. Install glovebag so that it completely covers the circumference of pipe or other structures where the work is to be done.
11. Use smoke tube and aspirator bulb to test seal. Place tube into water sleeve (two-inch opening to glove bag) squeezing bulb and filling bag with visible smoke. Remove smoke tube and twist water sleeve closed. While holding the water sleeve tightly, gently squeeze glove bag and look for smoke leaking out, (especially at the top and ends of the glove bag). If leaks are found, tape closed using duct tape and re-test.
12. Insert wand from garden sprayer through water sleeve. Duct tape water sleeve tightly around the wand to prevent leakage.
13. Thoroughly wet material to be worked on with amended water or removal encapsulant and allow to soak in. Wet adequately to penetrate and soak material through to substrate.
14. One person places their hands into the long-sleeved gloves while the second person directs garden sprayer at the work.
15. Use bone saw, if required, to cut insulation at each end of the section to be removed. A bone saw is a serrated heavy gauge wire with ring-type handles at each end. Throughout this process, spray amended water or removal encapsulant on the cutting area to keep dust to a minimum.

16. Remove insulation using putty knives or other tools. Place pieces in bottom of bag without dropping.
17. Rinse all tools with water inside the bag and place back into pouch.
18. Using scrub brush, rags and water, scrub and wipe down the exposed pipe.
19. Thoroughly wash and wipe down interior of glovebag to a point below the location where the bag will be twisted and taped to seal waste in bottom of bag.
20. Remove water wand from water sleeve and attach the small nozzle from HEPA-filtered vacuum. Turn on the vacuum only briefly to collapse the bag.
21. Remove the vacuum nozzle, twist water sleeve closed and seal with duct tape.
22. From outside the bag, pull the tool pouch away from the bag. Place duct tape over twisted portion and then cut the tool bag from the glove bag, cutting through the twisted/taped section. Contaminated tools may then be placed directly into next glove bag without cleaning. Alternatively, tool pouch with the tools can be placed in a bucket of water, opened underwater, and tools cleaned and dried. Discard rags and scrub brush with asbestos waste.
23. With removed insulation in the bottom of the bag, twist the bag several times and tape it to seal material in the bottom during removal of the glove bag from the pipe.
24. Slip a 6 mil (0.15 mm) disposal bag over the glove bag (still attached to the pipe). Remove tape or cut bag and open the top of the glove bag and fold it down into disposal bag.
25. Clean all surfaces in the Work Area using disposable cloths wetted with water with surfactant or removal encapsulant added. When these surfaces have dried, clean with a HEPA filtered vacuum. Material adhered to a surface with removal encapsulant may require the application of additional removal encapsulant to facilitate cleaning.

IF A REMOVAL ENCAPSULANT IS USED, TEST TO INSURE IT WILL NEITHER LEAVE A RESIDUE THAT WILL IMPEDE VISUAL INSPECTION NOR BECOME GUMMY DURING CLEANING.

26. Seal exposed ends of remaining pipe insulation in accordance with Section 15254.
27. Remove disposable suits and place these into bag with waste.
28. Collapse the bag with a HEPA vacuum twist top of bag, seal with at least 3 wraps of duct tape, bend over and seal again with at least 3 wraps of duct tape.

C. Negative Pressure Glove Bag Systems. Remove ACM inside a negative pressure glove bag system according to the following procedure:

1. Use at least two persons to perform glovebag removals operations.
2. Use each glovebag only once
3. Do not move glovebag once it has been mounted in place.
4. Do not use glovebag on surface whose temperature exceeds 150°F (65.6°C).
5. Check materials adjacent to location where glovebag will be installed. Wrap damaged (broken lagging, hanging, etc.), loose or friable material in 2 layers of 6 mil (0.15 mm) plastic and "candy-stripe" with duct tape, or render material intact by some other method. Place one layer of duct tape around undamaged pipe at each location where the glove bag will be attached.
6. Install glovebag so that it completely covers the circumference of pipe or other structure where the work is to be done.
7. Install device used to prevent collapse of bag by negative pressure.
8. Smoke-test Glovebags for leaks and seal any leaks prior to use.
9. Run HEPA vacuum cleaner or other device used to create a negative pressure in the bag continuously during the operation.
10. Prior to disposal, collapse glovebag by removing air within it using a HEPA vacuum.
11. Where system uses attached waste bag, connect waste bag to collection bag using hose or other material which will withstand pressure of ACM waste and water without losing its integrity.
 - a. Use sliding valve or other device to separate waste bag from hose to ensure no exposure when waste bag is disconnected.
12. Where a separate waste bag is used along with a collection bag and waste bag is discarded after one use, the collection bag may be reused if rinsed clean with amended water before reuse.

D. Negative Pressure Glove Box Systems: Remove ACM inside a negative glove box system according to the following procedure:

1. Use at least two persons to perform the work.

2. Check materials adjacent to location where glovebox will be installed. Wrap damaged (broken lagging, hanging, etc.), loose or friable material in 2 layers of 6 mil (0.15 mm) plastic and "candy-stripe" with duct tape, or render material intact by some other method. Place one layer of duct tape around undamaged pipe at each location where the glove box will be attached.
3. Use system in accordance with manufacturer's instructions.
4. Smoke test box prior to each use
5. Use a HEPA Vacuum or other negative pressure generator with HEPA filtration to create a negative pressure in system
6. Provide a back-up HEPA Vacuum on site at all times during operation of the system.
7. Use waste bags made of 6 mil (0.15 mm) thick plastic, double-bag before filling.

3.4 MINI-ENCLOSURES:

LOCATION OF REMOTE DECONTAMINATION UNIT SHOULD BE DESIGNATED.

- A. **A mini enclosure** is a small walk-in enclosure which accommodates no more than two persons. Provide a fabricated or job-made enclosure constructed of 6 mil (0.15 mm) plastic or equivalent. Place the enclosure under negative pressure by means of a HEPA filtered vacuum or similar HEPA filtered ventilation unit.
- B. **Provide a remote personnel decontamination unit** meeting requirements of Section 01563 "Decontamination Units" for worker decontamination.
- C. **Sequence of Work:** Before beginning work of this sub-section complete the following:
 1. Isolation of area in accordance with Section 01527 "Regulated Area."
 2. Construction of a personnel decontamination unit in accordance with Section 01563 Decontamination Units.
- D. **Work Room:** Construct Work Room in the same manner as a Primary Barrier fabricated from 6 mil (0.15 mm) sheet plastic. Arrange so that Primary Barrier provides both a Critical and Primary Barrier. Line walls and floor of Work Room with a continuous Secondary Barrier.
- E. **Change Room:** Provide an approximately 3 feet by 3 feet (0.9 m x 0.9 m) Change Room, with additional space as required for storage, attached to each Work Room. Fabricate Change Room from 6 mil (0.15 mm) sheet plastic in the same manner as a Primary Barrier. Locate so that access to Work Area is through Change Room.

- F. **Step Off Area:** Cover floor in front of entry to Change Room with one layer of 6 mil (0.15 mm) sheet plastic. Securely anchor sheet plastic to prevent slipping.
- G. **Flapped Door Construction:** Provide flapped door as entry to Change Room and entry from Change Room to Work Room. Fabricate each flapped door from overlapping contacting layers of sheet plastic. Fasten each layer on the top and one side. Each flap is to be 3 inches (76 mm) longer than door opening. Reinforce free side and bottom of each sheet with duct tape. Alternate sides that are fastened on each layer. Form arrows pointing to entry side from duct tape on inside and outside of door.

OSHA REQUIRES THAT WARNING SIGNS BE COMPREHENSIBLE TO NON-ENGLISH SPEAKERS.

- H. **Signage:** At entry to Change Room post an approximately 20 inch by 14 inch (508 mm x 356 mm) manufactured caution sign displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926:

Legend

DANGER

ASBESTOS

CANCER AND LUNG DISEASE HAZARD

AUTHORIZED PERSONNEL ONLY

RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

- 1. Provide spacing between respective lines at least equal to the height of the respective upper line.

- I. **Complete requirements** of the following:

- 1. Section 01560 Worker Protection - Asbestos Abatement
- 2. Section 01562 Respiratory Protection
- 3. Section 01513 Temporary Pressure Differential & Air Circulation System: HEPA filtered vacuum cleaner with vacuum in space outside Mini-Enclosure may be used for compliance with this section. Provide a minimum of 8 air changes per hour in the Work Room.

- J. **Testing:** The mini-enclosure shall be inspected for leaks and smoke tested to detect breaches, and breaches sealed.

- K. Entry to Work Room:** Require that any time a worker enter the Work Room the following procedure is followed.
1. Outside of Change Room remove all street clothes and don clean coveralls and respirator. A swim suit or second disposable suit may be worn beneath outer coveralls.
 2. Enter Change Room be sure that entry is completely closed.
 3. Enter Work Room be sure that entry is completely closed.
- L. Work Procedures:** Arrange work area within the mini-enclosure so that during use air movement is directed away from the worker's breathing zone.
- M. Worker Decontamination:** Require that any time a worker leaves the mini-Enclosure the following procedure be followed.
1. Maintain a bucket of clean potable water in the Work Area. Do not amend with a wetting agent.
 2. Remove contaminated suit inside the Work Area. Leave respirator in place.
 3. Wash hands, face and surface of respirator with water and wet paper towels. Use caution to avoid breaking seal between respirator face-piece and face.
 4. Proceed with respirator in place to Change Room.
 5. Be sure that entry to Work Area is completely closed.
 6. In Change Room don clean disposable suit leaving respirator in place.
 7. Exit change room be sure that entry to Change Room is completely closed. Proceed to next Mini-Enclosure, or a remote shower.
 8. At end of work day decontaminate fully in accordance with procedures in appropriate specification section describing Worker Protection.
- N. Material Decontamination:** Require that the following procedure be used in removing equipment and bagged debris from the Work Room.
1. Three workers are required. One in the Work Room, one in the Change Room, and one on Step Off Area.
 2. Equipment and bagged debris are to be removed from the Mini-Enclosure in separate operations.

3. Worker in Work Room cleans equipment and bagged debris and hands one piece of equipment or one bag of debris at a time to worker in Change Room.
 4. Worker in Change Room wet cleans each piece of equipment or bag and stores them in Change Room. Equipment is sealed completely in 6 mil (0.15 mm) sheet plastic in the Change Room.
 5. When the amount of stored material in the Change Room becomes large enough that the worker cannot clean incoming material without contacting previously cleaned material the door between the Work and Clean Room is closed.
 6. The worker in the Changing Room then passes each item into a new disposal bag held open in the doorway between the Changing Room and Step Off Area by the worker on the Step Off Area. The Worker on the Step Off Area places each bag in a sealed cart for transport to the load out area. No bags are to be stored outside of the Mini-Enclosure.
 7. All bags are to be transported through the building in clean sealed containers that have never been in a asbestos Work Area, Mini-Enclosure or decontamination unit.
- O. Mini-Enclosure Decontamination:** At completion of all work decontaminate the Work and Changing Rooms as set forth in Section 01711 Project Decontamination for non-friable materials.

END OF SECTION - 01529

SECTION 01560 - WORKER PROTECTION - ASBESTOS ABATEMENT

THIS SECTION IS INTENDED FOR LARGE SCALE ASBESTOS ABATEMENT PROJECTS INVOLVING REMOVAL, ENCAPSULATION, OR ENCLOSURE WHEN THERE IS CONSIDERABLE DISRUPTION OF THE MATERIAL BEING ENCLOSED. FOR MAINTENANCE AND REPAIR WORK AND FOR ENCLOSURE PROJECTS THAT LEAVE THE ASBESTOS-CONTAINING MATERIAL (ACM) RELATIVELY UNDISTURBED USE SECTION 01561. ANY REVISION OF THIS SECTION SHOULD BE CARRIED OUT WITH THE ASSISTANCE OF A CERTIFIED INDUSTRIAL HYGIENIST OR OTHER QUALIFIED OCCUPATIONAL HEALTH SPECIALIST.

THIS SECTION DOES NOT ADDRESS THE SUBJECT OF HEAT STRESS. THIS IS A COMMON PROBLEM ON ABATEMENT PROJECTS IN HOT ENVIRONMENTS. WHERE REQUIRED SPECIFIC PROVISION FOR PROTECTION AGAINST HEAT STRESS SHOULD BE DEVELOPED FOR THE SPECIFIC PROJECT AND INCLUDED IN THIS SECTION.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. This section describes the equipment and procedures required for protecting workers against asbestos contamination and other workplace hazards except for respiratory protection.

1.3 RELATED WORK SPECIFIED ELSEWHERE:

- A. **Respiratory Protection:** is specified in Section 01562.

1.4 WORKER TRAINING:

STATE OR LOCAL REGULATIONS COULD HAVE A MORE STRINGENT REQUIREMENT.

- A. **AHERA Accreditation:** All workers are to be accredited as Abatement Workers as required by the EPA Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

DELETE THE FOLLOWING IF NO STATE OR LOCAL REQUIREMENT. REVISE AS REQUIRED TO CORRESPOND WITH APPLICABLE CODE OR REGULATION.

- B. State and Local License:** All workers are to be trained, certified and accredited as required by state or local code or regulation.

USE ONE OF THE FOLLOWING REQUIREMENTS AS APPROPRIATE.

- C. Training - Class I:** Train in accordance with 29 CFR 1926.1101. Provide training for all workers who will perform Class I operations that is the equivalent in curriculum, training method and length to the EPA Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

WORKERS REMOVING CLASS II MATERIALS THAT ARE FRIABLE, OR BECOME FRIABLE IN THE COURSE OF THE REMOVAL, ARE REQUIRED TO MEET THE FULL EPA TRAINING PROGRAM

- D. Training - Class II Intact (Non-Friable):** Provide training for workers who will be performing Class II work involving only the removal and/or disturbance of one generic category of building material, such as roofing materials, flooring materials, siding materials or cement asbestos panels; which includes as a minimum the specific work practices and engineering controls which specifically relate to that category. Provide a course that includes "hands-on" training and takes at least 8 hours. Provide training that includes the elements set forth in 29 CFR 1926.1101(k) and the Compliance Directive CPL 2-2.63.
- E. Training - Class II Non-Intact (Friable):** Provide training for workers who will be performing Class II work on materials that are friable, or will become friable during the work that is the equivalent in curriculum, training method and length to the EPA Interim Final Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

FOLLOWING IS INTENDED FOR ABATEMENT PROJECTS. THIS SECTION MAY REQUIRE REVISION IF USED IN SPECIFYING WORK FOR OTHER TRADES (EG. ROOFING, FLOORING). SOME INDUSTRIES ARE NOT FAMILIAR WITH OSHA REQUIREMENTS FOR ASBESTOS. SOME INDUSTRY GROUPS MAY HAVE DEVELOPED OBJECTIVE DATA SATISFACTORY TO OSHA THAT OBIVIATES THE NEED FOR MEDICAL EXAMINATIONS.

1.5 MEDICAL SURVEILLANCE:

- A. Provide a medical surveillance program** for all employees who are:
 - 1.** engaged in Class I, II and III work for a combined total of 30 or more days per year or,
 - a.** For the purposes of this paragraph, any day in which a worker engages in Class II or Class III work or a combination thereof for one hour or less (taking into account the entire time spent on the removal operation, including cleanup) and, while doing so, adheres fully to the work practices specified in the OSHA standard (29 CFR 1926.1101) is not counted.

- 2. are exposed at or above the permissible exposure limit or excursion limit or,
 - 3. before an employee can be assigned to work requiring use of a respirator.
- B. Provide a medical surveillance program** and physician’s opinion before a respirator is assigned as required by 29 CFR 1910.134 and 29 CFR 1926.103(e)(10) .
- C. Provide medical examination** that as a minimum meets OSHA requirements as set forth in 29 CFR 1926.1101. In addition, require that the physician provide an evaluation of the individual’s ability to work in environments capable of producing heat stress in the worker.

1.6 SUBMITTALS:

- A. Before Start of Work:** Submit the following to the Designer for review. Do not start work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use.

FOLLOWING IS REQUIRED IN SCHOOLS AND GOOD PRACTICE IN GENERAL.

- 1. **AHERA Accreditation:** Submit copies of certificates from an EPA-approved AHERA Abatement Workers course for each worker as evidence that each asbestos Abatement Worker is accredited as required by the EPA Interim Final Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

DELETE THE FOLLOWING IF NO STATE OR LOCAL REQUIREMENT. REVISE AS REQUIRED TO CORRESPOND WITH APPLICABLE CODE OR REGULATION.

- 2. **State and Local License:** Submit evidence that all workers have been trained, certified and accredited as required by state or local code or regulation.
- 3. **Certificate Worker Acknowledgment:** Submit an original signed copy of the Certificate of Worker's Acknowledgment found at the end of this section, for each worker who is to be at the job site or enter the Work Area.

DELETE THE FOLLOWING IF THE AHERA COURSE CERTIFICATION IS RETAINED.

- 4. **Training Program:** Submit a course outline of the worker training course. Include date and time course was given, name and title of teacher.

5. **Report from Medical Examination:** conducted within last 12 months as part of compliance with OSHA medical surveillance requirements for each worker who is to enter the Work Area. Submit, at a minimum, for each worker the following:
 - a. Name and Social Security Number
 - b. The physician's written opinion as to whether the employee has any detected medical conditions that would place the employee at an increased risk of material health impairment from exposure to asbestos;
 - c. Any recommended limitations on the employee or on the use of personal protective equipment such as respirators; and
 - d. A statement that the employee has been informed by the physician of the results of the medical examination and of any medical conditions that may result from asbestos exposure.
 - e. A statement that the employee has been informed by the physician of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure (29 CFR 1926.1101(m)).
 - f. A legible typed version of the physician's name, the physician's signature, and date of examination.

6. **Notarized Certifications:** Submit certification signed by an officer of the abatement contracting firm and notarized that exposure measurements, medical surveillance, and worker training records are being kept in conformance with 29 CFR 1926.

PART 2 - EQUIPMENT

2.1 PROTECTIVE CLOTHING:

- A. **General.** Provide and require the use of protective clothing, such as coveralls or similar whole-body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos that exceed the TWA and/or excursion limit prescribed by 29 CFR 1926.1101 or for which a required negative exposure assessment is not produced, and for any employee performing Class I operations which involve the removal of over 25 linear or 10 square feet (7.5 linear meters or 3 square meters) of TSI or surfacing ACM or PACM.

REQUIREMENTS FOR SPECIAL CLOTHING SUCH AS COVERALLS OR SIMILAR WHOLE BODY CLOTHING, HEAD COVERINGS, GLOVES, AND FOOT COVERINGS AND OTHER PROTECTIVE CLOTHING ARE DELINEATED IN OSHA REGULATIONS. THE NEED FOR PROTECTIVE CLOTHING IN EXCESS OF THESE REQUIREMENTS SHOULD BE REVIEWED WITH A SAFETY CONSULTANT AND EDITED FOR THE SPECIFICS OF THE PROJECT.

- B. Coveralls:** Provide disposable full-body coveralls and disposable head covers, and require that they be worn by all workers in the Work Area. Provide a sufficient number for all required changes, for all workers in the Work Area.

FOLLOWING IS MORE APPROPRIATE WORKER PROTECTION IN ENVIRONMENTS WITH HOT OR COLD HAZARD TO WORKER.

- C. Coveralls:** Provide cloth full-body coveralls and hats, require that they be worn by all workers in the Work Area. Require that workers change out of coverall in the Equipment Room of the Personnel Decontamination Unit. Dispose of coverall as asbestos waste at completion of all work.

SELECT EITHER THE CATCH ALL PARAGRAPH BELOW OR EDIT THE REMAINING PARAGRAPHS OF THIS SUBSECTION ON PROTECTIVE CLOTHING. THE REMAINING PARAGRAPHS OF THIS SUBSECTION ON PROTECTIVE CLOTHING ARE COVERED UNDER THE OSHA REGULATION. IF THE DESIGNER SPECIFIES SUCH ITEMS OF PROTECTIVE CLOTHING, THEN THE DESIGNER MAY EFFECTIVELY BECOME THE CONTRACTOR'S SAFETY OFFICER.

- D. Additional Protective Clothing:** Provide each worker with the protective clothing as required by Federal State and local regulations. This includes, but is not necessary limited by Hardhats, Cold weather gear, Glove, boots and goggles.

FOLLOWING IS APPROPRIATE IF WORKERS ARE TO BE WORKING IN UNHEATED ENVIRONMENTS DURING COLD WEATHER. DELETE THE FOLLOWING TO AVOID ACCEPTING ANY OF THE CONTRACTOR'S RESPONSIBILITY FOR WORKER SAFETY. INCLUDE AND EDIT AS REQUIRED IF THIS IS NECESSITATED BY PROJECT SPECIFICS.

- E. Cold Weather Gear:** Provide each worker with an insulated jacket, pants, gloves, and hat. Require that cold weather gear be removed in Equipment Room of Personnel Decontamination Unit. Dispose of cold weather gear as asbestos waste at completion of all work.

MUCH OF THE FOLLOWING IS RUDIMENTARY WORKER PROTECTION REQUIREMENTS, BUT PROTECTION BEYOND RESPIRATORS AND PAPER SUITS IS FREQUENTLY NOT CONSIDERED FOR ABATEMENT PROJECTS. REVIEW THE FOLLOWING WITH A SAFETY CONSULTANT AND EDIT FOR THE SPECIFICS OF THE PROJECT. DELETE THE FOLLOWING TO AVOID ACCEPTING ANY OF THE CONTRACTOR'S RESPONSIBILITY FOR WORKER SAFETY. INCLUDE AND EDIT AS REQUIRED IF THIS IS NECESSITATED BY PROJECT SPECIFICS.

- F. Boots:** Provide work boots with non-skid soles, and where required by OSHA, foot protectives, for all workers. Provide boots at no cost to workers. Paint uppers of all boots red with waterproof enamel. Do not allow boots to be removed from the Work Area for any reason, after being contaminated with ACM. Dispose of boots as asbestos-contaminated waste at the end of the work.

- G. Hard Hats:** Provide head protectives (hard hats) as required by OSHA for all workers, and provide 4 spares for use by Designer, Project Administrator, and Owner. Label hats with same warning labels as used on disposal bags. Require hard hats to be worn at all times that work is in progress that may potentially cause head injury. Provide hard hats of type with plastic strap type suspension. Require hats to remain in the Work Area throughout the work. Thoroughly clean, decontaminate and bag hats before removing them from Work Area at the end of the work.

- H. **Goggles:** Provide eye protection (goggles) as required by OSHA for all workers involved in scraping, spraying, or any other activity which may potentially cause eye injury. Thoroughly clean, decontaminate and bag goggles before removing them from Work Area at the end of the work.
- I. **Gloves:** Provide work gloves to all workers and require that they be worn at all times in the Work Area. Do not remove gloves from Work Area and dispose of as asbestos-contaminated waste at the end of the work.

2.2 ADDITIONAL PROTECTIVE EQUIPMENT:

IF A TYPE C JOB IS BEING PLANNED, INCLUDE REQUIREMENTS FOR CONTRACTOR SUPPLIED RESPIRATORS FOR THE OWNER, DESIGNER, PROJECT ADMINISTRATOR AND OTHER AUTHORIZED REPRESENTATIVES.

- A. Disposable coveralls, head covers, and footwear covers shall be provided by the Contractor for the Owner, Designer, Project Administrator, and other authorized representatives who may inspect the job site. Provide six (6) complete coveralls per day.

PART 3 - EXECUTION

3.1 GENERAL:

- A. Provide worker protection as required by the most stringent OSHA and/or EPA standards applicable to the work. The following procedures are minimums to be adhered to regardless of fiber count in the Work Area.
- B. Each time Work Area is entered remove all street clothes in the Changing Room of the Personnel Decontamination Unit and put on new disposable coverall, new head cover, and a clean respirator. Proceed through shower room to equipment room and put on work boots.

3.2 DECONTAMINATION PROCEDURES:

- A. Require all workers to adhere to the following personal decontamination procedures whenever they leave the Work Area:
 - 1. Type C Supplied Air or Powered Air-Purifying Respirators: Require that all workers use the following decontamination procedure as a minimum requirement whenever leaving the Work Area:

- a. When exiting area, remove disposable coveralls, disposable head covers, and disposable footwear covers or boots in the equipment room.
 - b. Still wearing respirators, proceed to showers. Showering is mandatory. Care must be taken to follow reasonable procedures in removing the respirator to avoid asbestos fibers while showering. The following procedure is required as a minimum:
 - c. Thoroughly wet body including hair and face. If using a Powered Air-Purifying Respirator (PAPR) hold blower unit above head to keep canisters dry.
 - d. With respirator still in place thoroughly wash body, hair, respirator face piece, and all parts of the respirator except the blower unit and battery pack on a PAPR. Pay particular attention to seal between face and respirator and under straps.
 - e. Take a deep breath, hold it and/or exhale slowly, completely wet hair, face, and respirator. While still holding breath, remove respirator and hold it away from face before starting to breath.
 - f. Carefully wash facepiece of respirator inside and out.
- 2.** If using PAPR: shut down in the following sequence, first cap inlets to filter cartridges, then turn off blower unit (this sequence will help keep debris which has collected on the inlet side of filter from dislodging and contaminating the outside of the unit). Thoroughly wash blower unit and hoses. Carefully wash battery pack with wet rag. Be extremely cautious of getting water in battery pack as this will short out and destroy battery.
- a. Shower completely with soap and water.
 - b. Rinse thoroughly.
 - c. Rinse shower room walls and floor prior to exit.
 - d. Proceed from shower to Changing Room and change into street clothes or into new disposable work items.
- 3.** Air Purifying-Negative Pressure Respirators: Require that all workers use the following decontamination procedure as a minimum requirement whenever leaving the Work Area with a half or full face cartridge type respirator:
- a. When exiting area, remove disposable coveralls, disposable headcovers, and disposable footwear covers or boots in the Equipment Room.
 - b. Still wearing respirators, proceed to showers. Showering is mandatory. Care must be taken to follow reasonable procedures in removing the respirator and filters to

avoid asbestos fibers while showering. The following procedure is required as a minimum:

- c. Thoroughly wet body from neck down.
- d. Wet hair as thoroughly as possible without wetting the respirator filter if using an air purifying type respirator.
- e. Take a deep breath, hold it and/or exhale slowly, complete wetting of hair, thoroughly wetting face, respirator and filter (air purifying respirator). While still holding breath, remove respirator and hold it away from face before starting to breath.
- f. Dispose of wet filters from air purifying respirator.
- g. Carefully wash facepiece of respirator inside and out.
- h. Shower completely with soap and water.
- i. Rinse thoroughly.
- j. Rinse shower room walls and floor prior to exit.
- k. Proceed from shower to Changing Room and change into street clothes or into new disposable work items.

FOLLOWING DESCRIBES USE OF A DECONTAMINATION UNIT CONNECTED TO A WORK AREA AS A REMOTE SHOWER FOR MINI-ENCLOSURE WORK THAT MAY BE GOING ON ELSEWHERE IN THE BUILDING.

- B. Remote Shower:** The procedures above are to be used if the decontamination facility is used as a remote shower. If a worker cannot gain direct access to the Equipment Room require that he enter Decontamination Unit and proceed directly through Shower Room to Equipment Room. Decontamination procedure is then completed as required above.

SHOWERING IS SOMETIMES NOT REQUIRED FOR CONTAINMENT PROJECTS. IN THIS CASE, USE DECONTAMINATION PROCEDURES OF SECTION 01561.

- C. Within Work Area:**
 - 1. Require that workers NOT eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the Work Area. To eat, chew, drink or smoke, workers shall follow the procedure described above, then dress in street clothes before entering the non-Work Areas of the building.

3.3 CERTIFICATE OF WORKER'S ACKNOWLEDGEMENT:

MODEL ASBESTOS ABATEMENT GUIDE SPECIFICATION

1996

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Following this section is a Certificate of Worker Training. After each worker has been included in the Contractor's Respiratory Protection Program, completed the training program and medical examination, secure a fully executed copy of this form.

END OF SECTION - 01560

CERTIFICATE OF WORKER'S ACKNOWLEDGEMENT

PROJECT NAME _____ DATE _____

PROJECT ADDRESS _____

CONTRACTOR'S NAME _____

WORKING WITH ASBESTOS CAN BE DANGEROUS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCER. IF YOU SMOKE AND INHALE ASBESTOS FIBERS THE CHANCE THAT YOU WILL DEVELOP LUNG CANCER IS GREATER THAN THAT OF THE NON-SMOKING PUBLIC.

Your employer's contract with the Owner for the above project requires that: You be supplied with the proper respirator and be trained in its use. You be trained in safe work practices and in the use of the equipment found on the job. You receive a medical examination. These things are to have been done at no cost to you.

RESPIRATORY PROTECTION: You must have been trained in the proper use of respirators, and informed of the type respirator to be used on the above referenced project. You must be given a copy of the written respiratory protection manual issued by your employer. You must be equipped at no cost with the respirator to be used on the above project.

EDIT THE FOLLOWING AS APPROPRIATE

WORKERS REMOVING CLASS II MATERIALS THAT ARE FRIABLE, OR BECOME FRIABLE IN THE COURSE OF THE REMOVAL, ARE REQUIRED TO MEET THE FULL 32-HOUR EPA TRAINING PROGRAM.

TRAINING COURSE: You must have been trained in the dangers inherent in handling asbestos and breathing asbestos dust and in proper work procedures and personal and area protective measures. This training must have been the equivalent in curriculum, training method and length to the EPA Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

MEDICAL EXAMINATION: You must have had a medical examination within the past 12 months at no cost to you. This examination must have included: health history, pulmonary function tests and may have included an evaluation of a chest x-ray.

By signing this document you are acknowledging only that the Owner of the building you are about to work in has advised you of your rights to training and protection relative to your employer.

Signature _____ Social Security No _____

Printed Name _____ Witness _____

SECTION 01561 - WORKER PROTECTION - REPAIR AND MAINTENANCE

GENERAL COMMENTS

This section describes the training, equipment and procedures necessary to protect workers against asbestos contamination and other work place hazards during maintenance activities. The activities involved are Class III OSHA work and are limited in size to operations that generate small amounts of ACM, i.e., no more than can be contained in a standard (60 inch x 60 inch) glove or waste bag filled no more than 1/3 to 1/2 full. Respiratory protection is covered in a different section. This section is intended to be used with several other sections to write specifications for O&M work that is going to be hired out to an asbestos abatement contractor rather than being performed by facility maintenance staff. O&M programs are frequently structured so that work that can be accomplished while avoiding ACM is carried out by facility staff, and work that actually disturbs ACM is contracted out. NIBS publishes a manual on the design of asbestos O&M programs and work practices: *GUIDANCE MANUAL, Asbestos Operations & Maintenance Work Practices*. Refer to the NIBS O&M Manual, the introduction, and the evaluation for section 02083 for more discussion on the design of asbestos O&M programs.

- **01527 Regulated Areas:** This section provides the language for specifying the set up of a regulated area, as required by OSHA, in the area in which operations and maintenance work is to take place.
- **01528 Entry Into Controlled Areas:** Requirements for O&M activities such as entry into a space above a suspended ceiling where there is an asbestos-containing fireproofing are set forth in this section.
- **01562 Respiratory Protection:** Establishes procedures and equipment for adequate protection against inhalation of airborne asbestos fibers.
- **02083 Disturbance of ACM During O&M**

Work: This section is used to specify the O&M work activities for which there is a negative exposure assessment, and the work is performed in the open. Work of this section is performed in a regulated area.

- **01529 Mini-enclosures and Glovebags:** Control procedures for maintenance activities that involve the disturbance of small areas of asbestos-containing materials, but for which there is no negative exposure assessment, or that involve drilling, cutting, abrading, sanding, chipping, breaking or sawing of TSI or surfacing material are set forth in this section.

The following sections are also intended to be used in securing contractor services in support of an operations and maintenance program. The specifications of the contracted portion of a typical asbestos O&M program will probably include most or all of the following sections. These sections need to be combined with the administrative specification sections and the other parts of the contract. Refer to the introduction for more information on the administrative specification sections and the necessary parts necessary for a complete set of Contract Documents.

- **01046 Cutting and Patching - Asbestos-Containing Materials:** This section describes procedures to be used if asbestos-containing materials must be cut and patched.
- **01712 Cleaning and Decontamination Procedures:** Sets forth procedures to clean up asbestos debris and dust, and procedures to decontaminate objects and rooms.
- **02084 Disposal of Asbestos-Containing Waste Material:** The requirements for the proper

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containing, transport and disposal of asbestos waste are set forth in this section.

- **Section 02085 Resilient Flooring Removal - Resilient Floor Covering Manufacturers' Recommended Non-Aggressive Work Practices:** This section describes the work practices for intact removal of resilient flooring, and the requirements for a negative exposure assessment for this sort of work. This section is written to be a "stand-alone" performance based specification for resilient flooring removal. It could be used to bid this work separately from

other O&M work. Revision would be required to make this section work with the other O&M sections. However, the necessary work practices can be excerpted from "Part 3-Execution" of this section and inserted in Section 02083.

- **15254 Repair of Insulation and Lagging:** Describes repair of insulation on pipes and other equipment using procedures that involve primarily bridging encapsulants and fabric reinforcing.

SECTION 01561 - WORKER PROTECTION-REPAIR AND MAINTENANCE

THIS SECTION IS INTENDED FOR MAINTENANCE AND REPAIR WORK (CLASS III ASBESTOS WORK). THE ACTIVITIES INVOLVED ARE LIMITED IN SIZE TO OPERATIONS THAT GENERATE SMALL AMOUNTS OF ACM, I.E., NO MORE THAN CAN BE CONTAINED IN A STANDARD (60 INCH X 60 INCH) GLOVE OR WASTE BAG FILLED NO MORE THAN 1/3 TO 1/2 FULL. USE SECTION 01560 FOR ASBESTOS ABATEMENT PROJECTS INVOLVING REMOVAL, ENCAPSULATION, OR ENCLOSURE. ANY REVISION OF THIS SECTION SHOULD BE CARRIED OUT WITH THE ASSISTANCE OF A CERTIFIED INDUSTRIAL HYGIENIST OR OTHER QUALIFIED OCCUPATIONAL HEALTH SPECIALIST.

PART 1 - GENERAL**1.1 RELATED DOCUMENTS:**

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. **This section describes** the equipment and procedures for protecting workers against asbestos contamination and other workplace hazards, except for respiratory protection, where asbestos fibers are collected at the point of generation so that contamination of workers is unlikely.
- B. **This section applies** only where the airborne fiber counts as measured in accordance with 29 CFR 1926.1101 are below 0.1 fibers per cubic centimeter for an 8 hour Time Weighted Average (TWA) and the excursion limit of 1.0 f/cc.

1.3 RELATED WORK SPECIFIED ELSEWHERE:

- A. **Respiratory Protection:** is specified in Section 01562.

DELETE THE FOLLOWING IF SECTION 01560 IS NOT INCLUDED IN THE SPECIFICATION.

- B. **Worker Protection:** for asbestos abatement work where workers will be in areas that contain or may contain airborne fiber counts measured in accordance with 29 CFR 1926 above 0.1 fibers per cubic centimeter for an 8 hour Time Weighted Average (TWA) or above 1.0 fibers per cubic centimeter for a 30 minute Excursion Limit (EL) is specified in Section 01560.

1.4 DESCRIPTION OF REQUIREMENTS:

- A. **Worker protection requirements** of this section are appropriate for asbestos maintenance and repair work. This differs from asbestos abatement in that the work is not performed in an asbestos-

fiber-contaminated area. As such, the worker decontamination procedures are carried out with a HEPA-filtered vacuum cleaner rather than a shower facility.

B. Requirements of this section apply only when work is being performed in accordance with the limitations and requirements of the following sections of this specification:

1. 01527 Regulated Areas
2. 01528 Entry Into Controlled Areas
3. 01529 Mini Enclosures and Glovebags for glovebag work.
4. 01712 Cleaning and Decontamination Procedures
5. 02083 Disturbance of ACM During O&M Work
6. 15254 Repair of Insulation and Lagging

C. When the work being performed is governed under any other specification section or required by any of the above sections or during work in a mini-enclosure the requirements of Section 01560 Worker Protection - Asbestos Abatement apply.

1.5 WORKER TRAINING:

A. AHERA Accreditation: All workers are to be accredited as required by the EPA Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

DELETE THE FOLLOWING IF NO STATE OR LOCAL REQUIREMENT. REVISE AS REQUIRED TO CORRESPOND WITH APPLICABLE CODE OR REGULATION.

B. State and Local License: All workers are to be trained, certified, accredited, or licensed as required by state or local code or regulation.

C. Training: Provide training in accordance with 29 CFR 1926.1101 for all workers that is the equivalent in curriculum and training method to that of the 16-hour Operations and Maintenance course developed by EPA for maintenance and custodial workers. [40 CFR 763.92(a)(2)]. Provide training that includes "hands-on" training in the use of respiratory protection and work practices and shall take at least 16 hours.

INCLUDE EITHER PARAGRAPH ABOVE OR BELOW AND DELETE THE OTHER. PARAGRAPH ABOVE COMPLIES WITH OSHA REQUIREMENTS IN MOST SITUATIONS. THE PARAGRAPH BELOW IS THE LEVEL OF TRAINING MOST FREQUENTLY PROVIDED FOR WORKERS PROVIDED BY ABATEMENT CONTRACTORS FOR CONTRACTED O&M WORK.

D. Training: Provide training for all workers that is the equivalent in curriculum, training method and length to the EPA Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

1.6 MEDICAL EXAMINATIONS:

- A. Provide a medical surveillance program** for all employees who are engaged in Class I, II and III work for a combined total of 30 or more days per year or are exposed at or above the permissible exposure limit or excursion limit. A medical exam also is required before an employee can be assigned to work requiring the use of a respirator.
 - 1.** For the purposes of this paragraph, any day in which a worker engages in Class II or Class III work or a combination thereof for one hour or less (taking into account the entire time spent on the removal operation, including cleanup) and, while doing so, adheres fully to the work practices specified in the OSHA standard (29 CFR 1926.1101) is not counted.
- B. Provide a medical surveillance program** and physician’s opinion before a respirator is assigned as required by 29 CFR 1910.134 and 29 CFR 1926.103(e)(10).
- C. Provide medical examination** that as a minimum meets OSHA requirements as set forth in 29 CFR 1926.1101. In addition, require that the physician provide an evaluation of the individual’s ability to work in environments capable of producing heat stress in the worker.

1.7 SUBMITTALS:

- A. Before Start of Work:** Submit the following to the Designer for review. Do not start work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use.

FOLLOWING IS REQUIRED IN SCHOOLS AND GOOD PRACTICE IN GENERAL.

- 1. AHERA Accreditation:** Submit copies of certificates from an EPA-approved AHERA Abatement Workers course for each worker as evidence that each asbestos Abatement Worker is accredited as required by the EPA Interim Final Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

DELETE THE FOLLOWING IF NO STATE OR LOCAL REQUIREMENT. REVISE AS REQUIRED TO CORRESPOND WITH APPLICABLE CODE OR REGULATION.

- 2. State and Local License:** Submit evidence that all workers have been trained, certified, accredited or licensed as required by state or local code or regulation.
- 3. Historic Airborne Fiber Data:** Submit airborne asbestos fiber count data from an independent air monitoring firm to verify that work procedures will result in an airborne fiber level as measured in accordance with 29 CFR 1926 below 0.1 fibers per cubic centimeter as an 8 hour Time Weighted Average (TWA). Include at least the following data for each procedure required by the work:

- a. Date of measurements
 - b. Operation monitored
 - c. Sampling and analytical methods used and evidence of their accuracy
 - d. Number, duration, and results of samples taken
4. **Certificate Worker Acknowledgment:** Submit an original signed copy of the Certificate of Worker's Acknowledgment found at the end of this section, for each worker who is to be at the job site or enter the Work Area.
5. **Training Program:** Submit a course outline of the worker training course. Include date and time course was given, name and title of teacher and attendance sheet listing all attendees of the course. Submittal shall be in the form of a letter signed and dated by the course teacher.
6. **Report from Medical Examination:** Conducted within last 12 months as part of compliance with OSHA medical surveillance requirements for each worker who is to enter the Work Area. Submit, at a minimum, for each worker the following:
- a. Name and Social Security Number
 - b. The physician's written opinion as to whether the employee has any detected medical conditions that would place the employee at an increased risk of material health impairment from exposure to asbestos;
 - c. Any recommended limitations on the employee or on the use of personal protective equipment such as respirators; and
 - d. A statement that the employee has been informed by the physician of the results of the medical examination and of any medical conditions that may result from asbestos exposure.
 - e. A statement that the employee has been informed by the physician of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure.
 - f. A legible typed version of the physician's name, the physician's signature, and date of examination.
7. **Notarized Certifications:** Submit certification signed by an officer of the abatement contracting firm and notarized that exposure measurements, medical surveillance, and worker training records are being kept in conformance with 29 CFR 1926.

PART 2 - EQUIPMENT

2.1 PROTECTIVE CLOTHING:

- A. General.** Provide and require the use of protective clothing, such as coveralls or similar whole-body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos that exceed the TWA and/or excursion limit prescribed by 29 CFR 1926.1101 or for which a required negative exposure assessment is not produced, and for any employee performing Class I operations which involve the removal of over 25 linear or 10 square feet (7.5 linear meters or 3 square meters) of TSI or surfacing ACM or PACM.

REQUIREMENTS FOR SPECIAL CLOTHING SUCH AS COVERALLS OR SIMILAR WHOLE BODY CLOTHING, HEAD COVERINGS, GLOVES, AND FOOT COVERINGS AND OTHER PROTECTIVE CLOTHING ARE DELINEATED IN OSHA REGULATIONS. THE NEED FOR PROTECTIVE CLOTHING IN EXCESS OF THESE REQUIREMENTS SHOULD BE REVIEWED WITH A SAFETY CONSULTANT AND EDITED FOR THE SPECIFICS OF THE PROJECT

- B. Coveralls:** Provide disposable full-body coveralls and disposable head covers, and require that they be worn by all workers in the Work Area. Provide a sufficient number for all required changes, for all workers in the Work Area.

FOLLOWING IS MORE APPROPRIATE WORKER PROTECTION IN ENVIRONMENTS WITH HOT OR COLD HAZARD TO WORKER.

- C. Coveralls:** Provide cloth full-body coveralls and hats, require that they be worn by all workers in the Work Area. Require that workers change out of coverall in the Equipment Room of the Personnel Decontamination Unit. Dispose of coverall as asbestos waste at completion of all work.

SELECT EITHER THE CATCH ALL PARAGRAPH BELOW OR EDIT THE REMAINING PARAGRAPHS OF THIS SUBSECTION ON PROTECTIVE CLOTHING. THE REMAINING PARAGRAPHS OF THIS SUBSECTION ON PROTECTIVE CLOTHING ARE COVERED UNDER THE OSHA REGULATION. IF THE DESIGNER SPECIFIES SUCH ITEMS OF PROTECTIVE CLOTHING, THEN IN SOME JURISDICTIONS THE DESIGNER BECOMES THE CONTRACTOR'S SAFETY OFFICER.

- D. Additional Protective Clothing:** Provide each worker with the protective clothing as required by Federal State and local regulations. This includes, but is not necessary limited by Hardhats, Cold weather gear, Glove, boots and goggles.

FOLLOWING IS APPROPRIATE IF WORKERS ARE TO BE WORKING IN UNHEATED ENVIRONMENTS DURING COLD WEATHER. DELETE THE FOLLOWING TO AVOID ACCEPTING ANY OF THE CONTRACTOR'S RESPONSIBILITY FOR WORKER SAFETY. INCLUDE AND EDIT AS REQUIRED IF THIS IS NECESSITATED BY PROJECT SPECIFICS

- E. Cold Weather Gear:** Provide each worker with an insulated jacket, pants, gloves, and hat. Require that cold weather gear be removed in Equipment Room of Personnel Decontamination Unit. Dispose of cold weather gear as asbestos waste at completion of all work.

MUCH OF THE FOLLOWING IS RUDIMENTARY WORKER PROTECTION REQUIREMENTS, BUT PROTECTION BEYOND RESPIRATORS AND PAPER SUITS IS FREQUENTLY NOT CONSIDERED ON ASBESTOS PROJECTS. REVIEW THE FOLLOWING WITH A SAFETY CONSULTANT AND EDIT FOR THE SPECIFICS OF THE PROJECT. DELETE THE FOLLOWING TO AVOID ACCEPTING ANY OF THE CONTRACTOR'S RESPONSIBILITY FOR WORKER SAFETY. INCLUDE AND EDIT AS REQUIRED IF THIS IS NECESSITATED BY PROJECT SPECIFICS.

- F. Boots Covers:** Provide disposable latex boot covers with non-skid soles, and where required, OSHA approved foot protectives, for all workers. Boot covers shall not be worn out of the Work Area or off the sheet plastic drop layer for any reason. Boot covers may be decontaminated, bagged and carried from one Work Area to another.
- G. Hard Hats:** Provide head protectives (hard hats) as required by OSHA for all workers, and provide 4 spares for use by Designer, Project Administrator, and Owner. Label hats with same warning labels as used on disposal bags. Require hard hats to be worn at all times that work is in progress that may potentially cause head injury. Provide hard hats of type with plastic strap type suspension. Hats shall be thoroughly cleaned and decontaminated before being worn from one Work Area to another. At the end of the work, clean and decontaminate hats and bag for storage in a properly labeled asbestos disposal bag.
- H. Goggles:** Provide eye protectives (goggles) as required by OSHA for all workers involved in scraping, spraying, or any other activity which may potentially cause eye injury. Goggles shall be thoroughly cleaned and decontaminated before being worn from one Work Area to another. At the end of the work, clean and decontaminate goggles and bag for storage in a properly labeled asbestos disposal bag.
- I. Gloves:** Provide work gloves to all workers and require that they be worn at all times in the Work Area Do not remove gloves from Work Area and dispose of as asbestos contaminated waste at the end of the work.
- J. Hearing Protection:** Provide hearing protection as required by OSHA for all workers using noisy equipment or working in noisy environments. Thoroughly clean and decontaminate headset or ear-muff type hearing protectors and reusable ear stopples before they are worn from one Work Area to another or at the end of work. Dispose of disposable ear stopples before leaving work area and provide new ear stopples at each work area.

PART 3 - EXECUTION

3.1 GENERAL:

- A. Work and Decontamination** procedures involve a person in the work area on the plastic sheet and one off the sheet. The person on the sheet carries out the work and never leaves the sheet until the work is complete and dry decontamination procedures are completed. The person off the sheet supplies materials to and accepts material from the on-sheet person. The off sheet

person never enters the Work Area. If the work involves more than one person then the team shall consist of two (or more) on-sheet persons and one off-sheet person.

- B. Do not eat, drink, smoke,** chew gum or tobacco, or apply cosmetics in the Work Area. To eat, drink, chew, or smoke, workers shall follow the procedures described below and leave the Work Area.
- C. Provide worker protection** as required by the most stringent OSHA and/or EPA standards applicable to the work. The following procedures are minimums to be adhered to regardless of fiber count in the Work Area.

MINIMUM REQUIREMENTS FOR AIR MONITORING ARE SET FORTH IN OSHA ASBESTOS REGULATIONS. REVISE THIS SECTION WITH THE ASSISTANCE OF THE TESTING LABORATORY WHO IS TO PROVIDE ANALYSIS. CONTRACTOR SHOULD BE GIVEN TRAINING AND PROVIDED WITH LOG SHEETS BY THE LABORATORY. IF A MORE STRINGENT STANDARD OF CARE IS REQUIRED USE AN INDEPENDENT TESTING LABORATORY TO COLLECT AS WELL AS ANALYZE SAMPLES. FOLLOWING MAKES EMERGENCY RESPONSE BY THE CONTRACTOR FOR PROBLEMS SUCH AS LEAKING PIPES WITH ASBESTOS INSULATION MORE FEASIBLE.

3.2 AIR MONITORING:

- A. Monitor Air** as follows at all times that the work is going on:
 - 1. Personal Air Samples:** Collect a personal air sample on the on-sheet person at all times that work is being carried out. Collect samples at 2 liters per minute for the entire time that work is being carried out. Use cellulose ester filters with 0.8 to 1.2 micron pore size to collect samples.
 - 2. Area Samples:** Collect one area sample in each secure area during or at completion of the work. Collect a 600 - 3000 liter sample at a maximum pumping rate of 12 liters per minute. Use cellulose ester filters with 0.8 to 1.2 micron to collect samples.
- B. Transmit Samples** to Owner's testing laboratory for analysis. Owner will provide a copy of all air monitoring data to the Contractor.

3.3 RESPIRATORS:

- A. Instruct and train** each worker in proper respirator use and require that each worker always wear a respirator, properly fitted on the face, in the Work Area.

3.4 COVERALLS:

- A. At the Start of Each Work Shift:** Put on new disposable coveralls, new head covers, new footwear covers over street shoes, and put on a clean respirator.

- B. **All workers shall wear** disposable, full-body coveralls and disposable head and footwear covers in the Work Area.
- C. **Follow procedures** under "Dry Decontamination" whenever leaving a Work Area.

3.5 ADDITIONAL PROTECTIVE EQUIPMENT:

- A. **At the work site** maintain 2 complete sets of protective equipment including disposable coveralls, head covers, and footwear covers for use by the Designer or the Owner.

3.6 DECONTAMINATION PROCEDURES:

- A. **Require all Workers** to adhere to the following personal decontamination procedures whenever they leave the Work Area or at end of work shift:

USE THE FOLLOWING PROCEDURE ONLY IN SITUATIONS WHERE THE WORKER HAS NOT BEEN IN AN ENVIRONMENT WHERE THERE IS AN AIRBORNE CONCENTRATION OF ASBESTOS IN EXCESS OF BUILDING BACKGROUND, AND THE PROTECTIVE CLOTHING WORN BY THE WORKER HAS NOT BEEN VISIBLY CONTAMINATED. IF EITHER OF THESE CONDITIONS EXIST, THE WORKER SHOULD USE THE WET DECONTAMINATION PROCEDURES FOUND IN SECTION 01560.

- 1. **Dry Decontamination:** Complete the following before leaving any Regulated Area.
 - a. Each person HEPA vacuum thoroughly the other person. Use brush attachment on the HEPA vacuum.
 - b. While still wearing respirator each person removes their paper suit, turning it inside out while removing it. Roll up suit and pack in hood.
 - c. Place suits in a disposal bag.
 - d. Suck air out of bag with HEPA vacuum.
 - e. Twist the bag shut, bend over and seal with duct tape by wrapping around bag neck at least 3 times.

IF THE WORK INVOLVES OPERATIONS (SUCH AS GLOVE BAG REMOVAL OR PROCEDURES OF SECTION 01528) IN WHICH THE WORKER DOES NOT BECOME CONTAMINATED, THE FOLLOWING IS ADEQUATE. IF THERE IS ANY POSSIBILITY OF WORKER CONTAMINATION THE WET DECONTAMINATION PROCEDURES OF SECTION 01560 SHOULD BE USED INSTEAD OF THE FOLLOWING.

- 2. **End Of Shift:** Require that each worker decontaminate according to the following procedure at the end of the days work or before removing respiratory protection.
 - a. Each person HEPA vacuum hands, hair, face, and respirator.

- b. Each person HEPA vacuum area of respirator seal to face on the other person.
- c. Remove respirator and, HEPA vacuum face at respirator seal and all surfaces of the respirator. HEPA vacuum any parts of hair or head covered by respirator straps.
- d. If using PAPR, shut down in the following sequence: first cap inlets to filter cartridges, then turn off blower unit (this sequence will help keep debris which has collected on the inlet side of filter from dislodging and contaminating the outside of the unit). Thoroughly wash blower unit and hoses. Carefully wash battery pack with wet rag. Be extremely cautious of getting water in battery pack as this will short out and destroy battery.
- e. Wash respirator face piece inside and outside.
- f. At completion of above, thoroughly wash face and hands with soap and water.

DELETE THE FOLLOWING IF NO WET DECONTAMINATION IS NECESSARY. THIS WILL GENERALLY OCCUR WHEN THE WORK INVOLVES ONLY OPERATIONS IN WHICH THE WORKER DOES NOT EXPERIENCE ELEVATED AIRBORNE FIBER LEVELS OR CONTAMINATION WITH DEBRIS (E.G. WORK OF SECTION 01528, GLOVE BAG WORK).

- g. Require that each worker follow the wet decontamination procedures set forth in Section 01560 at the end of each days work before changing into street clothing.

3.7 CERTIFICATE OF WORKER'S ACKNOWLEDGMENT:

- A. Following this section is a Certificate of Worker's Acknowledgment. After each worker has been included in the Contractor's Respiratory Protection Program and completed the training program and medical examination, secure a fully executed copy of this form.

END OF SECTION - 01561

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME _____ DATE _____

PROJECT ADDRESS _____

CONTRACTOR'S NAME _____

WORKING WITH ASBESTOS CAN BE DANGEROUS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCER. IF YOU SMOKE AND INHALE ASBESTOS FIBERS THE CHANCE THAT YOU WILL DEVELOP LUNG CANCER IS GREATER THAN THAT OF THE NON-SMOKING PUBLIC.

Your employer's contract with the Owner for the above project requires that: You be supplied with the proper respirator and be trained in its use. You be trained in safe work practices and in the use of the equipment found on the job. You receive a medical examination. These things are to have been done at no cost to you.

RESPIRATORY PROTECTION: You must have been trained in the proper use of respirators, and informed of the type respirator to be used on the above referenced project. You must be given a copy of the written respiratory protection manual issued by your employer. You must be equipped at no cost with the respirator to be used on the above project.

EDIT THE FOLLOWING AS APPROPRIATE

TRAINING COURSE: You must have been trained at a course the equivalent in curriculum and training method to the 16-hour Operations and Maintenance course developed by EPA for maintenance and custodial workers who conduct activities that will result in the disturbance of ACM. [40 CFR 763.92(a)(2)]. This course must have included "hands-on" training in the use of respiratory protection and work practices and shall take at least 16 hours.

MEDICAL EXAMINATION: You must have had a medical examination within the past 12 months at no cost to you. This examination must have included: health history, pulmonary function tests and may have included an evaluation of a chest x-ray.

By signing this document you are acknowledging only that the Owner of the building you are about to work in has advised you of your rights to training and protection relative to your employer.

Signature _____ Social Security No _____

Printed Name _____ Witness _____

SECTION 01562 - RESPIRATORY PROTECTION

TYPES OF RESPIRATORS

There are two categories of respirators used for asbestos abatement work. Those that filter or purify air taken from the work area before the worker breathes it are known as air purifying respirators.

Those that bring air from outside the work area to the worker are known as atmosphere supplying respirators.

AIR PURIFYING RESPIRATORS

Negative Pressure Air Purifying Respirators (APR): May be half-face or full-face. Air is drawn through filters mounted on the face piece of the respirator by the inhalation of the worker. The filters must be HEPA filters of the variety for use on asbestos abatement projects. This type of respirator is referred to as a negative pressure respirator because the air pressure inside of the face piece becomes negative each time the wearer breathes in (inhales). If there is a fault in either the seal or the fit of the respirator to the worker's face the negative pressure allows contaminated air to be drawn in and inhaled. The HEPA filters in negative pressure air purifying respirators are routinely discarded as contaminated waste after the worker showers.

Powered Air Purifying Respirators (PAPR): These respirators use a battery-powered blower unit to pump air from the work area in the immediate vicinity of the worker through a HEPA

filter into the face piece. With a tight-fitting face piece (particularly full face), they provide a higher level of protection than negative pressure respirators because the blower unit positively pressurizes the air within the face piece. A leak or failure of the face-piece seal will result in filtered (decontaminated) air leaking outward rather than contaminated air leaking inward. The units are compact and permit good mobility for workers, especially those working on scaffolds and ladders. PAPRs can be fitted with loose fitting face pieces, hoods and helmets all of which provide a lower level of protection than a tight-fitting face piece. Problems associated with this type of respirator include both rapid battery failure and "worker over-breathing" (breathing more air than can be provided by the battery-powered blower; for instance, during periods of heavy exertion). These units can receive water damage in the shower. This can be serious because current practice is to reuse the HEPA filter(s) on these units.

ATMOSPHERE SUPPLYING RESPIRATORS

Supplied Air or Type-C Respirators: Bring air from outside the contaminated work area. The air is compressed, filtered, cooled, and carried by flexible hose to the workers. Not all Type C systems provide equal levels of protection. A pressure demand (Type C) respirator maintains positive pressure at all times in the interior of the

facepiece and provides the greatest level of protection. Many believe Type C respirators offer the highest level of respiratory protection available. It provides cooling for workers, protects against other contaminants such as paint fumes without adding additional filter cartridges, eliminates consumable supplies such as filter cartridges, and is

the only form of respiratory protection appropriate in oxygen deficient atmospheres. However, the design of supplied air systems requires very specialized knowledge and experience. This system, if not properly designed, installed, and operated, can present immediate and life threatening hazards to workers. There is a hazard from carbon monoxide poisoning. Available safety alarms and monitors are not "fail safe." Supply air hoses constitute potential safety hazards to workers on scaffolds and ladders, and present tripping hazards to other workers.

Experienced and competent operators are essential

OSHA REQUIREMENTS

OSHA requires that a respirator be used during: all Class I work, Class II work where ACM is not removed in a substantially intact condition, Class II and III work performed without wet methods, Class II and III work where there is no negative exposure assessment, Class III work where TSI or surfacing material is being disturbed, Class IV work where other workers in the area are required to wear a respirator, whenever engineering controls and work practices are inadequate to maintain airborne fiber levels below the PEL or EL, and in emergencies. The respirator must be able to reduce the level inside the facepiece to the PEL or below. The OSHA regulations require that an employer provide a

when contractors use this type of respiratory equipment. Project designers should seek the advice of specialists in designing and specifying these systems.

Self-Contained Breathing Apparatus

(SCBA): This type of respirator is similar to the SCUBA equipment used by skin-divers. It is well suited to applications such as tunnels and difficult-to-access work areas where the distribution of hoses is difficult. Problems include the limited supply of air and the weight of the air tank.

worker with a powered, air-purifying respirator (PAPR), in lieu of a negative pressure respirator, upon the worker's request and provided the PAPR provides adequate protection.

Workers with facial hair, glasses, or other conditions which prevent a good face seal from forming, must be provided with respirators, such as hooded PAPRs, which adequately fit. Many workers will shave their beards and/or adjust their eyeglass temple bar positions so as to obtain adequate fit with negative pressure respirators. Corrective glasses must not interfere with the seal of the facepiece to the face of the wearer.

EPA AND NIOSH RECOMMENDATIONS

The EPA has recommended different types of respiratory protection for dedicated asbestos abatement projects and operations and maintenance (O&M) activities.

Abatement Projects: In *A Guide to Respiratory Protection for the Asbestos Abatement Industry* (EPA 560-OPTS-86-001, April 1986) EPA/NIOSH have recommended that either supplied-air respirators (SAR) or self-contained breathing apparatus (SCBA) be used whenever a worker can

reasonably be expected to be exposed to measurable airborne asbestos fiber levels and wherever feasible on abatement projects.. The EPA has subsequently indicated that this level of protection may not be feasible on some abatement projects where the encumbrances of a supplied air system might create safety hazards.

Operations and Maintenance: The EPA recommends that respiratory protection for O&M activities be based on the activity rather than on

measured exposures. This is a recommendation and not a regulation. EPA indicates that while these activities do not always create fiber levels high enough to trigger OSHA requirements, they can do so. This is similar to the OSHA requirement for respiratory protection for Class III (O&M) work: performed dry; or in the absence of a negative exposure assessment; or involving TSI or surfacing; or when the PEL of EL is exceeded. Only the last requirement is dependent on actual fiber levels. The EPA does not recommend supplied air respirators

for O&M work except for clean up of a major fiber release.

The EPA Green Book recommends the use of a respirator for routine O&M operations where there is a reasonable likelihood of ACM disturbance. Even when contact with asbestos is unlikely, the Green Book recommends that a respirator be available for use.

SPECIFYING LEVELS OF RESPIRATORY PROTECTION

The owner or contractor may elect to exceed the OSHA regulated standard of care. The appropriate design and health professionals, as well as legal counsel, should be consulted in arriving at a position on respiratory protection. The appropriate consultants should determine an appropriate standard of care for use on a given project. Certified

industrial hygienists (CIH) or medical doctors with specialties in occupational or preventative medicine are appropriate disciplines for this purpose. The legal, ethical, and cost implications of this decision should be evaluated carefully.

SECTION 01562 - RESPIRATORY PROTECTION

THIS SECTION SHOULD BE EDITED WITH THE ASSISTANCE OF A CERTIFIED INDUSTRIAL HYGIENIST OR OTHER QUALIFIED HEALTH PROFESSIONAL.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. **Instruct and train each worker** involved in asbestos abatement or maintenance and repair of friable asbestos-containing materials (ACM) in proper respiratory use and require that each worker always wear a respirator, properly fitted on the face in the Work Area from the start of any operation which may cause airborne asbestos fibers until the Work Area is completely decontaminated. Use respiratory protection appropriate for the fiber level encountered in the work place or as required for other toxic or oxygen-deficient situations encountered.

1.3 DEFINITIONS:

- A. "Negative Pressure Respirator": A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
- B. "Protection Factor": The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
- C. "Respirator": A device designed to protect the wearer from the inhalation of harmful atmospheres.

1.4 STANDARDS:

- A. **Except to the extent** that more stringent requirements are written directly into the Contract Documents, the latest edition of the following regulations and standards have the same force and effect (and are made a part of the Contract Documents by reference) as if copied directly into the Contract Documents, or as if published copies were bound herewith. Where there is a conflict in requirements set forth in these regulations and standards, meet the more stringent requirement.

THE FOLLOWING STANDARDS SHOULD BE IN HAND AND REFERRED TO DURING EDITING OF THIS SECTION.

1. **OSHA** - U.S. Department of Labor Occupational Safety and Health Administration, Safety and Health Standards Section 29 CFR 1910.1001, Section 1910.134, and Section 29 CFR 1926.1101.
2. **CGA** - Compressed Gas Association, Inc., New York, Pamphlet G-7, "Compressed Air for Human Respiration", and Specification G-7.1 "Commodity Specification for Air".
3. **CSA** - Canadian Standard Association, Rexdal, Ontario, Standard Z180.1, "Compressed Breathing Air".
4. **ANSI** - American National Standard Practices for Respiratory Protection, ANSI Z88.2.

ADD/SUBSTITUTE STATE OR LOCAL REQUIREMENTS IF MORE STRINGENT THAN THE ABOVE OR TO SUIT PROJECT REQUIREMENTS.

5. **NIOSH** - National Institute for Occupational Safety and Health
 - NIOSH Respirator Decision Logic (May 1987) DHHS/NIOSH Publication No. 87-108;
 - NIOSH/EPA, "A Guide to Respiratory Protection for the Asbestos Abatement Industry" EPA-560-OPTS-86-001 (September 1986);
 - 42 CFR 84, NIOSH Standard for Certification of Non-Powered Air Purifying Respirator filters;
 - 30 CFR 11, NIOSH - Certification of Respirators
6. **MSHA** - Mine Safety and Health Administration

1.5 SUBMITTALS:

- A. **Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal is returned for unrestricted use.
 1. **Product Data:** Submit manufacturer's product information for each component used, including NIOSH and MSHA Certifications for each component in an assembly and/or for entire assembly.
 2. **System Diagram:** When a supplied air respiratory system is required by the work, submit drawing showing assembly of components into a complete supplied air respiratory system. Include diagram showing location of compressor, filter banks, backup air supply tanks, hose line connections in Work Area(s), routing of air lines to Work Area(s) from compressor.
 3. **Operating Instruction:** Submit complete operating and maintenance instructions for all components and systems as a whole. Submittal is to be in bound manual form suitable for field use.

4. **Respiratory Protection Program:** Submit Contractor's written respiratory protection program manual as required by OSHA 1926.1101.
5. **Initial Exposure Assessment:** Submit level of respiratory protection intended for each operation required by the project. Base this selection on an "Initial Exposure Assessment" as required by OSHA 29 CFR 1926.1101. Submit information to support this "Initial Exposure Assessment" on the form included at the end of this Section.
 - a. Submit data from exposure monitoring for the PEL and EL from prior asbestos jobs within 12 months;
 - b. Submit monitoring and analysis that were performed in compliance with the OSHA asbestos standard in effect;
 - c. Submit data that was obtained under workplace conditions "closely resembling" those that will exist during the Work;
 - d. Submit data from past asbestos jobs where the type of asbestos abatement and other work, material, control methods, work practices, and environmental conditions closely resemble those that will exist during the Work;
 - e. Submit exposure data from prior asbestos jobs where the work that was conducted by employees whose training and experience are no more extensive than that of employees performing the current job;
 - f. Based on the exposure data from the previous asbestos jobs, select respiratory protection for the Work that will, to a high degree of certainty, prevent worker exposures (inside the respirator) that exceed the Permissible Exposure Limits (PEL) set forth in this Section of the specifications.
6. **Resume information:** Submit resume and information on training for individual monitoring the operation of supplied air respiratory systems. Submit training certifications where applicable.

1.6 AIR QUALITY FOR SUPPLIED AIR RESPIRATORY SYSTEMS:

- A. **Provide air** used for breathing in supplied air respiratory systems that meets or exceeds standards set for C.G.A. type 1 (Gaseous Air) Grade H or CSA Z180.1 whichever presents the more stringent quality standard:

DELETE EITHER ABOVE OR BELOW. ABOVE IS A HIGHER STANDARD. BOTH OSHA AND ANSI REQUIRE CGA GRADE D AIR FOR BREATHING. INCLUDING THE CGA GRADE H AND CSA STANDARD SETS A LIMIT (UNDER "HALOGENATED SOLVENTS" AND "OTHER GASEOUS CONTAMINANTS") ON THE HALOGEN CONTAMINANTS THAT CAN RESULT FROM OVERHEATING OF OIL-LESS COMPRESSORS. THE GRADE D STANDARD IS SILENT ON THIS CONTAMINANT.

REQUIRING GRADE H OR CSA Z180.1 AIR IS CONSERVATIVE, BUT PRACTICAL WITH PRESENT DAY EQUIPMENT. THIS ALLOWS A LARGER MARGIN FOR ERROR IF SOMETHING GOES WRONG. WHILE MODERN EQUIPMENT CAN GENERALLY MEET THE STANDARDS CALLED FOR ABOVE, THERE MAY BE A PROBLEM WITH AVAILABILITY OF MEASURING DEVICES WITH WHICH TO MONITOR THIS QUALITY OF AIR.

- B. **Provide air** used for breathing in supplied air respiratory systems that meets or exceeds standards set for C.G.A. type 1 (Gaseous Air) Grade D:

1.7 ALLOWABLE CONTAMINANTS:

- A. **Supply air** that has an asbestos concentration no greater than outside ambient conditions.
- B. **Supply air** that meets the level of contaminants allowed according to the air quality standard specified.
- C. **The following table** sets forth the quantity of any given contaminant allowed according to the referenced standards:

CONTAMINANT	CGA Type 1 (Gaseous Air)			CSA Z180.1
	Grade D	Grade E	Grade H	
Carbon Monoxide, PPM/v	20	10	5	5
Carbon Dioxide, PPM/v	1000	500	500	500
Condensed Hydrocarbons, mg./cu. meter	5	5		1
Gaseous Hydrocarbons - as methane, PPM/v			10	25
Water Vapor - PPM/v dewpoint	(1) -50F	(1) -50F	(1) -50F	27 -63F
Objectionable Odors	None	None	None	None
Nitrogen Dioxide, PPM/v	-	-	0.5	0.2
Nitrous Oxide, PPM/v	-	-	-	5
Sulfur Dioxide, PPM/v	-	-	0.5	-
Halogenated solvents, PPM/v	-	-	1	-
Other gaseous contaminants	-	-	-	(2)
Inorganic particulates, mg./cu. meter	-	-	-	1

- Indicates that the standard shows no limiting characteristics

- (1) The CGA standards do not indicate a specific moisture limit when the ambient temperature is above freezing. However, since a moisture content no greater than a -50 Degrees Fahrenheit (-45.56 Degrees Celsius) dewpoint (66 PPM/v) is necessary for carbon monoxide elimination, the CO limits could not be met unless the air were dried to a -50 Degrees Fahrenheit (-45.56 Degrees Celsius) dewpoint or better.
- (2) Maximum allowable content of trichlorotrifluoroethane, dichlorodifluoromethane, and chlorodifluoromethane is 2 PPM/v for each. Unlisted contaminants shall not exceed one-tenth of the Threshold Limit Values (TLV's) for Chemical Substances in Workroom air adopted by the American Conference of Governmental Industrial Hygienists (ACGIH).

1.8 DELIVERY:

- A. **Deliver replacement parts**, etc., not otherwise labeled by NIOSH or MSHA to job site in manufacturer's containers.

PART 2 - EQUIPMENT

OSHA REGULATIONS ALLOW RESPIRATORY PROTECTION TO BE SELECTED BASED UPON THE AIRBORNE FIBER COUNTS ENCOUNTERED IN THE WORK PLACE.

EPA HAS NOT PROMULGATED ANY REGULATIONS MORE STRINGENT THAN THOSE OF OSHA BUT, EPA AND NIOSH HAVE ISSUED A RECOMMENDATION THAT FAR EXCEEDS THE OSHA REGULATION. EPA AND NIOSH RECOMMEND THAT AIR PURIFYING RESPIRATORS BE USED ONLY IN SITUATIONS WHERE MEASURABLE QUANTITIES OF AIRBORNE ASBESTOS ARE NOT DETECTABLE, AND THE USE OF THE RESPIRATOR IS A PRECAUTION AGAINST ACCIDENTAL DISTURBANCE OF ASBESTOS-CONTAINING MATERIALS. SITUATIONS IDENTIFIED BY THE RECOMMENDATION ARE THOSE SUCH AS PRE-ABATEMENT INSPECTIONS, PREPARATION OF ABATEMENT AREAS, FINAL CLEANING, REMOVAL OF THE LAST LAYER OF PLASTIC, GLOVE BAG REMOVALS ETC.

STRICT ADHERENCE TO RECOMMENDATIONS FOR SUPPLIED AIR RESPIRATORS MAY IN MANY INSTANCES BE IMPRACTICAL AND EVEN UNSAFE FOR THE WORKER. SUPPLIED AIR RESPIRATORY PROTECTION SHOULD BE USED ONLY WHERE IT IS PROPERLY SETUP, MAINTAINED AND CONTINUOUSLY MONITORED BY TRAINED PERSONNEL. IF THIS IS NOT DONE PROPERLY, WORKERS COULD BE SUBJECTED TO A VERY REAL LIFE HAZARD FROM THE SYSTEM THAT IS SUPPOSED TO BE PROTECTING THEM.

2.1 AIR PURIFYING RESPIRATORS

- A. **Respirator Bodies:** Provide half face or full face type respirators. Equip full face respirators with a nose cup or other anti-fogging device as would be appropriate for use in air temperatures less than 32 degrees Fahrenheit (0 degrees Celsius).
- B. **Filter Cartridges:** Provide, at a minimum, HEPA type filters labeled with NIOSH and MSHA Certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Asbestos-

Containing Dusts and Mists" and color coded in accordance with 42 CFR Part 84 and ANSI Z228.2. Also, additional cartridge sections may be added, if required, for solvents, etc., in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH/MSHA Certification.

- C. **Non-permitted respirators.** Do not use single use, disposable or quarter face respirators.

EPA AND NIOSH RECOMMEND THE USE OF A SELF-CONTAINED BREATHING APPARATUS (SCBA) WITH A FULL FACEPIECE OPERATING IN PRESSURE-DEMAND MODE OR THE USE OF A TYPE C SUPPLIED AIR RESPIRATOR WITH A SCBA EMERGENCY BACKUP.

2.2 SUPPLIED AIR RESPIRATOR SYSTEMS:

- A. **Provide equipment** capable of producing air of the quality and volume required by the above reference standards applied to the job site conditions and crew size. Comply with provisions of this specification if more stringent than the governing standard.
- B. **Facepiece and Hose:** Provide full facepiece and hose by same manufacturer that has been certified by NIOSH/MSHA as an approved Type "C" respirator assembly operating in pressure demand mode with a positive pressure facepiece.

THE FOLLOWING RESPIRATOR ASSEMBLY IS RECOMMENDED BY EPA AND NIOSH BUT IS CURRENTLY NOT AVAILABLE IN THE PRESSURE- DEMAND TYPE EQUIPMENT RECOMMENDED. SEVERAL MANUFACTURER'S HAVE INDICATED TO NIOSH THAT THIS EQUIPMENT COULD BE PROVIDED. VERIFY AVAILABILITY BEFORE INCLUDING THE FOLLOWING PARAGRAPH. IF THIS TYPE OF EQUIPMENT IS UNAVAILABLE THEN THE CONTRACTOR IS LEFT WITH NO ALTERNATIVE THAN TO USE THE MORE CUMBERSOME TYPE OF EQUIPMENT INDICATED FOR OXYGEN DEFICIENT ATMOSPHERES.

- C. **Auxiliary backup system:** In atmospheres which contain sufficient oxygen (greater than or equal to 19.5 percent oxygen) provide a pressure-demand full facepiece supplied air respirator equipped with an emergency back up HEPA filter.
- D. **Escape air supply:** In atmospheres which are oxygen deficient (less than 19.5 percent oxygen) provide a pressure-demand full facepiece supplied air respirator incorporating an auxiliary self-contained breathing apparatus (SCBA) which automatically maintains an uninterrupted air supply in pressure demand mode with a positive pressure face piece.
- E. **Backup air supply:** Provide a reservoir of compressed air located outside the Work Area which will automatically maintain a continuous uninterruptable source of air automatically available to each connected facepiece and hose assembly in the event of compressor shut-down, contamination of air delivered by compressor, power loss or other failure. Provide sufficient capacity in the back-up air supply to allow a minimum escape time of one-half hour times the number of connections available to the Work Area. Air requirement at each connection is the air requirement of the respirators in use plus the air requirement of an average-sized adult male engaged in moderately strenuous activity.

- F. Warning device:** Provide a warning device that will operate independently of the building's power supply. Locate so that alarm is clearly audible above the noise level produced by equipment and work procedures in use, in all parts of the Work Area and at the compressor. Connect alarm to warn of:
1. Compressor shut down or other fault requiring use of backup air supply
 2. Carbon Monoxide (CO) levels in excess of 5 PPM/V

A CARBON MONOXIDE MONITOR IS USUALLY NOT REQUIRED WHEN OIL-LESS COMPRESSORS ARE USED.

- G. Carbon Monoxide (CO) Monitor:** Continuously monitor and record on a strip chart recorder Carbon Monoxide (CO) levels. Place monitors in the air line between compressor and back-up air supply and between backup air supply and workers. Connect monitors so that they also sound an alarm as specified under "Warning Devices".
- H. Compressor Shut Down:** Interconnect monitors, alarms and compressor so that compressor is automatically shut down and the alarms sound if any of the following occur:
1. Carbon Monoxide (CO) concentrations exceed 5 PPM/v in the air line between the filter bank and backup air supply
 2. Compressor temperature exceeds normal operating range

FOLLOWING HELPS ELIMINATE A SERIES OF POTENTIAL PROBLEMS ASSOCIATED WITH EXHAUST FROM ENGINES AND COMBUSTIBLE FUELS AT A BUILDING SITE. HOWEVER, ELECTRIC COMPRESSOR MOTORS ARE USUALLY LARGE AND FREQUENTLY REQUIRE 3 PHASE POWER AND AS SUCH MAY HAVE REQUIREMENTS BEYOND WHAT IS AVAILABLE AT THE BUILDING WHERE WORK IS BEING DONE. EDIT FOLLOWING BASED UPON LOCAL PRACTICES AND EXPERIENCE OF CONTRACTORS IN BIDDING POOL.

- I. Compressor Motor:** Provide a compressor driven by an electric motor. Do not use a gas or diesel engine to drive compressor. Insure that electrical supply available at the work site is adequate to energize motor.

IF A GASOLINE OR DIESEL COMPRESSOR MOTOR IS MADE NECESSARY BY AN INADEQUATE BUILDING POWER SUPPLY OR OTHER FACTORS THE SAFEST LOCATION FOR THIS EQUIPMENT IS OUTSIDE OF THE BUILDING. FOSSIL-FUEL POWERED EQUIPMENT SHOULD NEVER BE SET UP INSIDE A BUILDING WITHOUT A SPECIFIC DESIGN BY SOMEONE KNOWLEDGEABLE IN THE FIRE SAFETY, VENTILATION AND EXHAUST REQUIREMENTS OF SUCH AN INSTALLATION. IF A FOSSIL-FUEL POWERED COMPRESSOR IS REQUIRED BY PROJECT REQUIREMENTS DELETE THE ABOVE AND USE BELOW, EDIT AS REQUIRED BY SPECIFIC PROJECT REQUIREMENTS.

- J. Compressor Location:** Locate compressor outside of building in location that will not impede access to the building, and that will not cause a nuisance by virtue of noise or fumes to occupied portions of the building.
- K. Air Intake:** Locate air intake remotely from any source of automobile exhaust or any exhaust from engines, motors, auxiliary generator or buildings.
- L. After-Cooler:** Provide an after-cooler at entry to filter system which is capable of reducing temperatures to outside ambient air temperatures.

- M. Self Contained Breathing Apparatus (SCBA):** Configure system to permit the recharging of ½ hour 2260 PSI (15.58 MPa) SCBA cylinders.

THE ABOVE IS A MINIMUM. SCBA CYLINDERS RATED AT 1 HOUR AND 4520 PSI (31.2 MPa) ARE IN COMMON USE IN SOME LOCALITIES. THIS PROVISION PERMITS PROJECT ADMINISTRATORS ACCESS TO WORK SITE WITH A SCBA AT ALL TIMES EVEN IF THE CONTRACTOR IS NOT WORKING AND SUPPLIED AIR SYSTEM IS SHUT DOWN OR UNMONITORED.

PART 3 - EXECUTION

3.1 GENERAL:

- A. Respiratory Protection Program:** Comply with ANSI Z88.2 "Practices for Respiratory Protection" and OSHA 29 CFR 1910.314 and 1926.103.
- B. Require** that respirators be used in the following circumstances:
1. During all Class I asbestos jobs.
 2. During all Class II work where the ACM is not removed in a substantially intact state,
 3. During all Class II and III work which is not performed using wet methods.
 4. During all Class II and III asbestos jobs where the employer does not produce a "negative exposure assessment".
 5. During all Class III jobs where TSI or surfacing ACM or PACM is being disturbed.
 6. During all Class IV work performed within regulated areas where employees performing other work are required to wear respirators.
 7. During all work covered by this section where employees are exposed above the OSHA PEL (TWA, or excursion limit).
 8. In emergencies. During emergencies where the airborne asbestos fiber concentration is not known, a self-contained breathing apparatus (SCBA) must be used.
- C. Require** that respiratory protection be used at all times that there is any possibility of disturbance of ACM whether intentional or accidental.
- D. Require** that a respirator be worn by anyone in a Work Area at all times, regardless of activity, during a period that starts with any operation which could cause airborne fibers until the area has been cleared for re-occupancy in accordance with Section 01711.
- E. Regardless of Airborne Fiber Levels:** Require that the minimum level of respiratory protection used be half-face air-purifying respirators with high efficiency filters.
- F. Do not allow** the use of single-use, disposable, or quarter-face respirators for any purpose.

3.2 FIT TESTING:

EPA AND NIOSH RECOMMEND THAT A QUANTITATIVE FIT TEST BE PROVIDED FOR ANY TYPE OF NEGATIVE PRESSURE RESPIRATOR INCLUDING SUPPLIED AIR RESPIRATORS THAT ARE EQUIPPED WITH A EMERGENCY BACKUP HEPA FILTER.

- A. **Initial Fitting:** Provide initial fitting of respiratory protection during a respiratory protection course of training set up and administered by a individual qualified to do fit testing. Fit types and sizes of respirator to be actually worn by each individual. Allow an individual to use only those respirators for which training and fit testing has been provided.
- B. **On a Weekly Basis,** check the fit of each worker's respirator by having irritant smoke blown onto the respirator from a smoke tube.
- C. **Upon Each Wearing:** Require that each time an air-purifying respirator is put on it be checked for fit with a positive and negative pressure fit test in accordance with the manufacturer's instructions or ANSI Z88.2 .

3.3 TYPE OF RESPIRATORY PROTECTION REQUIRED:

THIS SECTION SETS FORTH THE LEVEL OF RESPIRATORY PROTECTION REQUIRED BY THE PROJECT. A CERTIFIED INDUSTRIAL HYGIENIST OR OTHER QUALIFIED OCCUPATIONAL HEALTH PROFESSIONAL SHOULD BE CONSULTED WHILE SELECTING THE TYPE OF RESPIRATORY PROTECTION TO BE REQUIRED.

- A. **General:** After reducing airborne asbestos levels to the lowest feasible level with engineering controls and work practices, provide respiratory protection as necessary to ensure that workers are not exposed to an airborne concentration of asbestos in excess of the Specified Permissible Exposure Limits (SPEL) set forth in this Section.
- B. **Level of Respiratory Protection:** Determine the proper level of respiratory protection by dividing the expected or actual airborne fiber count in the Work Area by the "protection factors" given below. The level of respiratory protection which supplies an airborne fiber level inside the respirator, at the breathing zone of the wearer, at or below the Specified Permissible Exposure Limits (PEL) set forth in this Section is the minimum level of protection allowed.
- C. **Specific Respiratory Protection Requirements:** Provide respiratory protection as indicated below as a minimum requirement:

THE FOLLOWING IS BASED ON A SPECIFIED PERMISSIBLE EXPOSURE LEVEL OF 0.01 F/CC. EDIT AS REQUIRED IF A DIFFERENT REQUIREMENTS IS USED OR THE OSHA PEL OF 0.1 F/CC IS USED.

- 1. **Half-face Negative Pressure Air-Purifying Respirators:** Provide half-face negative pressure air-purifying respirators during installation of Critical or Primary Barriers or other activities where there has been an "Initial Exposure Assessment" that has determined that airborne asbestos fiber levels will not exceed 0.1 fiber per cubic centimeter (0.1 f/cc). Provide a PAPR where a half-face negative pressure air-purifying respirator is allowed to any worker who so requests.

- 2. **Powered Air-Purifying Respirators (PAPR):** Provide powered air-purifying respirators (PAPR) during removal of asbestos-containing thermal system insulation (TSI) or surfacing material where there has been an “Initial Exposure Assessment” that has determined that airborne asbestos fiber levels will not exceed 1.0 fiber per cubic centimeter (1.0 f/cc).
- 3. **Type "C" Supplied-air respirators:** full facepiece pressure demand supplied air respirators are to be used by all workers engaged in the removal of thermal system insulation (TSI) or surfacing materials, or demolition of pipes, structures, or equipment covered or insulated with asbestos, or in the removal or demolition of asbestos insulation or coverings, or any other activity which results in or may result in airborne asbestos fiber levels above 1.0 fibers per cubic centimeter (1.0 f/cc).

OSHA REQUIRES THE USE OF SUPPLIED AIR RESPIRATORS IN CERTAIN SITUATIONS WHERE THERE IS A POTENTIAL EXPOSURE TO ELEVATED LEVELS OF ASBESTOS OR THERE IS NOT ANY PAST DATA SHOWING THE EXPECTED LEVELS. HOWEVER EPA AND NIOSH RECOMMEND THEIR USE IN SITUATIONS WHERE THERE IS EXPOSURE OR POTENTIAL EXPOSURE TO AIRBORNE ASBESTOS.

IF THE CONTRACTOR CANNOT PRODUCE AIR MONITORING DATA FROM PREVIOUS ASBESTOS JOBS, AN INITIAL EXPOSURE ASSESSMENT CANNOT BE MADE. IN THIS INSTANCE THE OSHA REGULATION REQUIRES THAT SUPPLIED AIR SYSTEMS BE USED UNTIL AN EXPOSURE ASSESSMENT IS MADE.

- D. **Provide** a full facepiece supplied air respirator operated in the pressure demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus for all workers within a regulated area where Class I work is being performed and for which an initial exposure assessment has not been produced. After an initial exposure assessment is made, use the level of respiratory protection required by that assessment and requirements of this specification and the OSHA Asbestos Construction Standard 29 CFR 1926.1101.

TYPE C "SUPPLIED AIR" RESPIRATORS CAN PRESENT A HAZARD FOR WORKERS ON SCAFFOLDING DUE TO THE DIFFICULTY OF HANDLING THE ATTACHED HOSES. IF A SUPPLIED AIR SYSTEM IS IMPROPERLY SET UP OR IT IS NOT CONTINUOUSLY MONITORED IT CAN PRESENT A VERY REAL LIFE SAFETY HAZARD FOR WORKERS.

3.4 SPECIFIED PERMISSIBLE EXPOSURE LIMITS (SPEL):

29 CFR 1926 REQUIRES THAT ENGINEERING CONTROLS AND WORK PRACTICES BE USED TO REDUCE AIRBORNE FIBER LEVELS TO THE LOWEST LEVELS ATTAINABLE BEFORE DETERMINING THE LEVEL OF RESPIRATORY PROTECTION REQUIRED. THIS CLEARLY MEANS THAT EVEN IF A VERY HIGH LEVEL OF RESPIRATORY PROTECTION IS PROVIDED (SUPPLIED AIR RESPIRATORS) CARE MUST BE TAKEN TO MAINTAIN WORK AREA FIBER COUNTS AT A LOW LEVEL.

EDIT THE FOLLOWING WITH THE ADVICE OF THE OWNER'S LEGAL COUNSEL AND A MEDICAL AND ENVIRONMENTAL CONSULTANT. PEL'S HAVE BEEN THE SUBJECT OF MUCH DISPUTE AND HAVE RECENTLY BEEN REVISED BY OSHA.

- A. **Specified Permissible Exposure Limits (SPEL):** Ensure that no worker is exposed to an airborne concentration of asbestos in excess of the Time-Weighted Average (TWA) limit , and Excursion Limit (EL) set forth below.

1. **Time Weighted Average (TWA) limit** - Concentration of airborne asbestos fibers to which any worker may be exposed as an eight (8) hour time-weighted average (TWA) shall not exceed the following.
 - a. 0.1 fibers per cubic centimeter

DELETE EITHER ABOVE OR BELOW. ABOVE IS CONSISTENT WITH THE CURRENT OSHA REGULATION. FOLLOWING IS THE MINIMUM FIBER LEVEL CONCENTRATION WHICH IS PRACTICAL TO MEASURE WITH A PHASE CONTRAST OPTICAL MICROSCOPE. SEVERAL OF THE EPA TRAINING CENTERS RECOMMEND THIS LEVEL TO ESTABLISH APPROPRIATE RESPIRATORY PROTECTION AS IT IS AN EPA-RECOMMENDED CLEARANCE LEVEL FOR CONTRACTOR RELEASE AT THE END OF AN ABATEMENT PROJECT.

- b. 0.01 fibers per cubic centimeter
2. **Excursion Limit (EL)** - Concentration of airborne asbestos fibers to which any worker may be exposed as averaged over a sampling period of thirty (30) minutes shall not exceed the following.
 - a. 1.0 fibers per cubic centimeter

FOLLOWING IS GENERAL PRACTICE AND MEETS OSHA REQUIREMENTS. ALWAYS RETAIN THIS PARAGRAPH. CURRENT OSHA STANDARDS ARE BASED ON THE OSHA REFERENCE METHOD (ORM) OF SAMPLING AND ANALYZING FOR THE PRESENCE OF AIRBORNE FIBERS. ANALYSIS BY OTHER METHODS IS ALLOWED IF THESE METHODS CAN DEMONSTRATE ANALYTICAL SENSITIVITY EQUIVALENT TO THAT OF "ORM". THE OSHA STANDARDS ARE SILENT ON ELECTRON MICROSCOPY.

- B. **Fibers:** For purposes of this section, fibers are defined as all fibers regardless of composition as counted in the OSHA Reference Method (ORM), or NIOSH 7400 procedure.

RETAIN THE FOLLOWING IF THIN FIBERS ARE A CONCERN. THE FOLLOWING ADDITION TO THE OSHA DEFINITION OF FIBERS IS NECESSARY TO DEFINE THE ANALYTICAL METHODS USED IN ENVIRONMENTS CONTAMINATED WITH MICROFIBERS (LESS THAN .25 MICRONS IN DIAMETER) WHICH ARE INVISIBLE TO AN OPTICAL MICROSCOPE. THIS LANGUAGE IS ALSO HELPFUL IN RESOLVING QUESTIONS ABOUT THE LEVEL OF RESPIRATORY PROTECTION REQUIRED IF AN AREA CONTAINS FIBERS OTHER THAN ASBESTOS.

1. **Electron Microscopy:** If Electron Microscopy is used to determine airborne fiber levels, only asbestos fibers will be enumerated, but fibers of any size detected by the testing of Section 01711 Project Decontamination will be counted.

3.5 RESPIRATORY PROTECTION FACTOR:

FOLLOWING ARE BASED ON CURRENT OSHA RESPIRATORY REQUIREMENTS. FOR MORE DETAIL ON PROTECTION FACTORS REFER TO ANSI Z88.2 AND NIOSH RESPIRATOR DECISION LOGIC (MAY 1987) DHHS/NIOSH PUBLICATION NO. 87-108. PROTECTION FACTORS ARE STRONGLY INFLUENCED BY RESPIRATOR FIT AND EASE WITH WHICH SEAL WITH THE FACE IS BROKEN DURING NORMAL USE. THE FACEPIECE OF A NEGATIVE PRESSURE RESPIRATOR IS AT A LOWER PRESSURE THAN AMBIENT EVERY TIME THE WEARER INHALES. THIS ALLOWS ASBESTOS FIBERS TO BE PULLED INTO THE FACE PIECE IF THE FACE SEAL IS IMPERFECT. ON THE OTHER HAND THE FACEPIECE OF A POSITIVE PRESSURE RESPIRATOR IS ALWAYS AT A HIGHER PRESSURE THAN AMBIENT SO THAT ANY LEAKAGE WILL BE OUTWARD. FOR THIS REASON POSITIVE PRESSURE RESPIRATORS SUPPLY MUCH GREATER PROTECTION THAN NEGATIVE PRESSURE RESPIRATORS AND ARE AWARDED HIGHER PROTECTION FACTORS.

A. Respirator Type	Protection Factor
<p>1. Air purifying: Negative pressure respirator High efficiency filter Half facepiece</p>	<p>10</p>
<p>2. Air purifying: Negative pressure respirator High efficiency filter Full facepiece</p>	<p>50</p>
<p>3. Powered Air Purifying (PAPR): Positive pressure respirator High efficiency filter Half facepiece</p>	<p>50</p>

ABOVE IS FROM NIOSH. NIOSH DE-RATES PAPR'S DUE TO THE POSSIBILITY OF OVER BREATHING THE BLOWER AND CREATING A NEGATIVE PRESSURE IN THE FACEPIECE WHEN BREATHING HEAVILY. BELOW IS FROM THE OSHA REGULATION 29 CFR 1926.1101. DETERMINE THE PROTECTION FACTOR TO BE USED AND THEN DELETE EITHER ABOVE OR BELOW.

<p>4. Powered air-purifying respirator equipped with high efficiency filters or any supplied air respirator operated in continuous flow mode. Full facepiece</p>	<p>100</p>
<p>5. Supplied air: Positive pressure respirator Pressure demand or other positive pressure mode Full facepiece Equipped with an auxiliary HEPA cartridge or positive pressure Self-contained breathing apparatus (SCBA) for escape</p>	<p>1,000</p>

3.6 AIR PURIFYING RESPIRATORS:

- A. Negative pressure - half or full face mask:** Supply a sufficient quantity of respirator filters approved for asbestos, so that workers can change filters during the work day. Require that respirators be wet-rinsed, and filters discarded, each time a worker leaves the Work Area. Require that new filters be installed each time a worker re-enters the Work Area. Store respirators and filters at the job site in the changing room and protect totally from exposure to asbestos prior to their use.

- B. Powered air purifying - half or full face mask:** Supply a sufficient quantity of high efficiency respirator filters approved for asbestos so that workers can change filters at any time that flow through the facepiece decreases to the level at which the manufacturer recommends filter replacement. Require that regardless of flow, filter cartridges be replaced after 40 hours of use. Require that HEPA elements in filter cartridges be protected from wetting during showering. Require entire exterior housing of respirator, including blower unit, filter cartridges, hoses, battery pack, face mask, belt, and cords, be washed each time a worker leaves the Work Area. Caution should be used to avoid shorting battery pack during washing. Provide an extra battery pack for each respirator so that one can be charging while one is in use.

3.7 SUPPLIED AIR RESPIRATOR:

- A. Air Systems Monitor:** Continuously monitor the air system operation including compressor operation, filter system operation, backup air capacity and all warning and monitoring devices at all times that system is in operation. Assign an individual, trained by manufacturer of the equipment in use or by a Certified Industrial Hygienist, in the operation and maintenance of the system to provide this monitoring. Assign no other duties to this individual which will take him away from monitoring the air system.

END OF SECTION - 01562

INITIAL EXPOSURE ASSESSMENT

Project No: _____

Date: _____

Project Name: _____

Facility: _____

Work Area(s): _____

Reference Job: _____

Description of Work: _____

Asbestos Containing Materials	Asbestos/Type Percentage
_____	_____
_____	_____
_____	_____

Task	Personal Monitoring Level			Respirator Worn	Comments
	High	Low	Average		
Prep / Set up	_____	_____	_____	_____	_____
Removal of Surface Trt	_____	_____	_____	_____	_____
Removal of TSI	_____	_____	_____	_____	_____
Removal of Misc Mat.	_____	_____	_____	_____	_____
Bag Out	_____	_____	_____	_____	_____
Clean Up	_____	_____	_____	_____	_____
Other	_____	_____	_____	_____	_____
Experience Level of Work Force _____					

Reference Job: _____

Description of Work: _____

Asbestos Containing Materials	Asbestos/Type Percentage
_____	_____
_____	_____
_____	_____

Task	Personal Monitoring Level			Respirator Worn	Comments
	High	Low	Average		
Prep / Set up	_____	_____	_____	_____	_____
Removal of Surface Trt	_____	_____	_____	_____	_____
Removal of TSI	_____	_____	_____	_____	_____
Removal of Misc Mat.	_____	_____	_____	_____	_____
Bag Out	_____	_____	_____	_____	_____
Clean Up	_____	_____	_____	_____	_____
Other	_____	_____	_____	_____	_____
Experience Level of Work Force _____					

Expected Conditions of This Job

Task	Anticipated Level	Respirator	Comments
Prep / Set up	_____ f/cc	_____	_____
Removal of Surface Trt	_____ f/cc	_____	_____
Removal of TSI	_____ f/cc	_____	_____
Removal of Misc Mat.	_____ f/cc	_____	_____
Bag Out	_____ f/cc	_____	_____
Clean Up	_____ f/cc	_____	_____
Other	_____ f/cc	_____	_____
Experience Level of Work Force _____			

SECTION 01563 - DECONTAMINATION UNITS

THE DECONTAMINATION UNITS PROVIDE TWO FUNCTIONS. THEY ARE THE LOCATION WHERE PERSONNEL AND MATERIALS ARE DECONTAMINATED BEFORE LEAVING THE WORK AREA. THEY ALSO ARE THE ONLY ACCESS BETWEEN THE WORK AREA AND THE REST OF THE BUILDING. THIS ACCESS MUST BE CONTROLLED TO PREVENT SPREAD OF CONTAMINATION INTO THE BUILDING. THE MEANS OF ACCOMPLISHING BOTH FUNCTIONS IS THE SAME. A CONTAMINATED PERSON MOVES DOWN A CONTAMINATED PATH TO A POINT OF DECONTAMINATION (THE SHOWER). AT THIS POINT THE PERSON IS RENDERED CLEAN AND FREE OF CONTAMINATION AND FOLLOWS A SECOND, CLEAN PATH OUT OF THE DECONTAMINATION UNIT TO THE BUILDING. CONTAMINATED MATERIALS ARE TAKEN THROUGH A PROCESS OF BECOMING CLEANER AS THEY GO THROUGH THE DECONTAMINATION UNIT.

THE PRACTICAL PROBLEM WITH THIS APPROACH IS THAT THE CONTAMINATED PATH CAN EASILY BECOME SO OVERBURDENED WITH CONTAMINATION THAT IT OVERWHELMS THE CAPABILITY OF THE DECONTAMINATION FACILITY. TO PREVENT THIS THE CONTAMINATED PATH MUST BE CLEANED PERIODICALLY TO PREVENT A BUILD-UP OF DEBRIS.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. **Provide separate Personnel and Equipment Decontamination facilities.** Require that the Personnel Decontamination Unit be the only means of ingress and egress for the Work Area. Require that all materials exit the Work Area through the Equipment Decontamination Unit.

1.3 RELATED WORK SPECIFIED ELSEWHERE:

- A. **Refer to Section 01503 Temporary Facilities** - Asbestos Abatement for electrical requirements and requirements relative to connection of decontamination facilities to building systems such as water, sewer, and electrical.

1.4 SUBMITTALS

- A. **Before the Start of Work:** Submit the following to the Designer for review. Do not begin work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use or final-but-restricted use.

EDIT THE FOLLOWING LIST. IN PARTICULAR, THE NUMBER OF SUBMITTALS MAY BE REDUCED IF EXISTING PRE-BUILT UNITS ARE TO BE USED BY THE CONTRACTOR.

1. Personnel Decontamination Unit: Provide shop drawing showing location and assembly of personnel decontamination units.
2. Equipment Decontamination Unit: Provide shop drawing showing location and assembly of equipment decontamination units.
3. Shower Pan: Provide shop drawing.
4. Shower Walls: Provide product data.
5. Shower Head and Controls: Provide product data.
6. Filters: Provide product data and shop drawing of installation on decontamination unit.
7. Hose Bib: Provide product data.
8. Shower Stall: for Wash Down Station provide product data and shop drawing showing and modifications.

DELETE FOLLOWING IF NO ELASTOMERIC MEMBRANE IS TO BE USED.

9. Elastomeric membrane: Provide product data.
10. Lumber: Provide product data on fire resistance treatment.
11. Sump Pump: Provide product data.
12. Signs: Submit samples of signs to be used.

PART 2 - PRODUCTS

EDIT THE FOLLOWING LIST TO ELIMINATE THOSE TYPES OF PLASTIC NOT USED.

FOLLOWING IS MOST LIKELY TO BE FOUND ON THE JOB IN THE ABSENCE OF A MORE SPECIFIC REQUIREMENT.

2.1 MATERIALS

- A. **Polyethylene Sheet:** A single polyethylene film in the largest sheet size possible to minimize seams, 6.0 mil (0.15 mm) thick, clear, frosted, or black as indicated.

FOLLOWING IS A GOOD GENERAL PRECAUTION AND SHOULD ALWAYS BE USED IN AREAS WHERE THERE IS HOT EQUIPMENT OR A POTENTIAL FOR FIRE, SUCH AS IN A BOILER ROOM. FIRE RETARDANT SHEET PLASTIC IS CONSIDERABLY MORE EXPENSIVE THAN STANDARD PLASTIC.

- B. Polyethylene Sheet:** Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick , frosted or black as indicated.

REINFORCED PLASTIC SHOULD BE USED IN EXTERIOR APPLICATIONS WHERE THE SHEET IS EXPECTED TO BE STRESSED BY WINDS OR IN ANY LOCATION WHERE HIGH SKIN STRENGTH IS REQUIRED. FOLLOWING IS AN EXAMPLE OF LANGUAGE WHICH CAN BE USED. EDIT TO SUIT PROJECT REQUIREMENTS.

- C. Reinforced Polyethylene Sheet:** Where plastic sheet is the only separation between the Work Area and building exterior, provide translucent, nylon reinforced, laminated, flame resistant, polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick , frosted or black as indicated.
- D. Duct Tape:** Provide duct tape in 2 inch or 3 inch (51mm or 76 mm) widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
- E. Spray Adhesive:** Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.
- F. Shower Pan:** Provide one piece waterproof shower pan 4 feet x 8 feet x 6 inches deep (102 mm X 204 mm x 152 mm deep). Fabricate from seamless fiberglass minimum 1/16 inch (1.59 mm) thick reinforced with wood, 18 ga. stainless or galvanized steel with welded seems, copper or lead with soldered seams, or a seamless liner of minimum 60 mil (1.5 mm) thick elastomeric membrane.
- G. Shower Walls:** Provide 8 feet (2.44 m) long by approximately 7 feet (2.13 m) high walls fabricated from rigid, impervious, waterproof material, either corrugated fiberglass roofing or equivalent. Structurally support as necessary for stability.
- H. Shower Head and Controls:** Provide a factory-made shower head producing a spray of water which can be adjusted for spray size and intensity. Feed shower with water mixed from hot and cold supply lines. Arrange so that control of water temperature, flow rate, and shut off is from inside shower without outside aid.
- I. Filters:** Provide cascaded filter units on drain lines from showers or any other water source carrying asbestos-contaminated water from the Work Area. Provide units with disposable filter elements as indicated below. Connect so that discharged water passes primary filter and output of primary filter passes through secondary filter.
1. Primary Filter - Passes particles 20 microns and smaller
 2. Secondary Filter - Passes particles 5 microns and smaller

- J. Hose Bib:** Provide heavy bronze angle type with wheel handle, vacuum breaker, and 3/4 inch (19.05 mm) National Standard male hose outlet.
- K. Shower Stall:** For Wash Down Station provide leak tight shower enclosure with integrated drain pan fabricated from fiberglass or other durable waterproof material, approximately 3 feet x 3 feet (0.91m x 0.91 m) square with minimum 6 feet (1.83 m) high sides and back. Structurally support as necessary for stability. Equip with hose bib, as specified in this section, mounted at approximately 4 feet (1.22 m) above drain pan. Connect drain to a reservoir, pump water from reservoir through filters to a drain or store and use for amended water. Mount filters inside shower stall on back wall beneath hose bib.

DELETE THE FOLLOWING IF ELASTOMERIC MEMBRANE IS NOT USED FOR SHOWER DOORS

- L. Elastomeric membrane:** Provide uniform flat sheets of flexible sheet roofing material fabricated from EPDM (ethylene propylene diene monomers) or Neoprene (polychloroprene), in a nominal 45 mil (1.14 mm) thickness.
- M. Lumber:** Provide kiln dried lumber of any grade or species.
- N. Sump Pump:** Provide totally submersible waterproof sump pump with integral float switch. Provide unit sized to pump 2 times the flow capacity of all showers or hoses supplying water to the sump, through the filters specified herein when they are loaded to the extent that replacement is required. Provide unit capable of pumping debris, sand, plaster or other materials washed off during decontamination procedures without damage to mechanism of pump. Adjust float switch so that a minimum of 3 inch (76 mm) remains between top of liquid and top of sump pan.

PART 3 - EXECUTION

3.1 PERSONNEL DECONTAMINATION UNIT:

THE PERSONNEL DECONTAMINATION UNIT IS HISTORICALLY THE MOST COMMON LOCATION OF FAILURE OF THE Work Area ISOLATION MEASURES. THIS TYPICALLY OCCURS BY A GRADUAL MIGRATION OF ASBESTOS LADEN DEBRIS THROUGH THE FACILITY. THE FOLLOWING ATTEMPTS TO OVERCOME THIS BY TWO MEANS. THE ENTIRE FACILITY IS CLEANED AFTER EACH SHIFT CHANGE TO PREVENT A BUILD-UP OF DEBRIS. UNDER THE BEST OF CIRCUMSTANCES THE PATH FROM THE WORK AREA TO THE SHOWER WILL BE CONTAMINATED. THE SHOWER BECOMES CONTAMINATED BY THE ENTRY OF A CONTAMINATED WORKER. THIS CONTAMINATION IS BY NO MEANS THEORETICAL. NORMALLY, IT TAKES THE FORM OF SPLATTERED DEBRIS ON ALL INTERIOR SURFACES OF THE SHOWER. THE PATH FROM THE SHOWER TO THE BUILDING MUST BE CLEAN. FOR THIS REASON THE SHOWER FACILITY DESCRIBED BELOW IS COMPLETELY WASHED DOWN AND HENCE DECONTAMINATED AS EACH WORKER SHOWERS. THIS STOPS THE SPREAD OF CONTAMINATION AT THE SHOWER.

THE FOLLOWING MAY HAVE TO BE REVISED TO COMPLY WITH LOCAL REGULATION. THERE IS GREAT VARIATION IN THE REQUIREMENTS FOR DECONTAMINATION FACILITIES FOUND IN STATE AND LOCAL REGULATIONS.

- A. **Provide a Personnel Decontamination Unit** consisting of a serial arrangement of connected rooms or spaces, Changing Room, Drying Room, Shower Room, Equipment Room. Require all persons without exception to pass through this Decontamination Unit for entry into and exiting from the Work Area for any purpose. Do not allow parallel routes for entry or exit. Do not remove equipment or materials through Personnel Decontamination Unit. Provide temporary lighting within Decontamination Units as necessary to reach a lighting level of 100 foot candles (1076 lumens / sq meter).

- B. **Changing Room (clean room):** Provide a room that is physically and visually separated from the rest of the building for the purpose of changing into protective clothing.
 - 1. Construct using polyethylene sheeting, at least 6 mil (0.15 mm) in thickness, to provide an airtight seal between the Changing Room and the rest of the building.
 - 2. Locate so that access to Work Area from Changing Room is through Shower Room.
 - 3. Separate Changing Room from the building by a sheet plastic flapped doorway.
 - 4. Require workers to remove all street clothes in this room, dress in clean, disposable coveralls, and don respiratory protection equipment. Do not allow asbestos-contaminated items to enter this room. Require Workers to enter this room either from outside the structure dressed in street clothes, or naked from the showers.
 - 5. An existing room may be utilized as the Changing Room if it is suitably located and of a configuration whereby workers may enter the Changing Room directly from the Shower Room. Protect all surfaces of room with sheet plastic as set forth in Section 01526 Temporary Enclosures. Authorization for this must be obtained from the Designer in writing prior to start of construction. Submit written request in accordance with Section 01632 "Substitutions" detailing layout and protective measures proposed.
 - 6. Maintain floor of changing room dry and clean at all times. Do not allow overflow water from shower to wet floor in changing room.
 - 7. Damp wipe all surfaces twice after each shift change with a disinfectant solution.
 - 8. Provide posted information for all emergency phone numbers and procedures.
 - 9. Provide 1 storage locker per employee.

DELETE BELOW IF NO ADDITIONAL COMPONENTS ARE SHOWN ON THE DRAWINGS.

- 10. Provide all other components indicated on the contract drawings.

DELETE THE FOLLOWING IF AN AIRLOCK IS NOT REQUIRED AT THIS POINT. NORMALLY THE DRYING ROOM WILL BE ADEQUATE AS AN AIRLOCK. CONFER WITH LOCAL AUTHORITIES HAVING JURISDICTION OVER THE PROJECT.

- C. Airlock:** Provide an airlock between Drying Room and Changing Room. This is a transit area for workers.
1. Separate this room from Drying Room and Changing Room by sheet plastic flapped doorways.
 2. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 3. Separate this room from the Drying and Changing Rooms with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
- D. Drying Room:** Provide a drying room as an airlock and a place for workers to dry after showering.
1. Construct room by providing a pan continuous with or draining to Shower Room pan. Install a freely draining wooden or non-skid metal floor in pan at elevation of top of pan.
 2. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 3. Separate this room from the Changing Room and Shower Room with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 4. Separate from Changing Room by a sheet plastic flapped doorway.
 5. Provide a continuously adequate supply of disposable bath towels.
- SOME DECONTAMINATION UNITS INCLUDE THE FOLLOWING. DELETE IF THE MORE COMMON ARRANGEMENT OF FLAPPED DOORS IS TO BE USED.
6. Provide a rigid, tight-sealing hinged door between Drying Room and Clean Room. Arrange so that there is a sensible movement of air from clean room through breathing zone of worker in Shower and Drying Room toward Equipment Room.
- E. Shower Room:** Provide a completely watertight operational shower to be used for transit by cleanly dressed workers heading for the Work Area from the Changing Room, or for showering by workers headed out of the Work Area after undressing in the Equipment Room.

1. Construct room by providing a shower pan and 2 shower walls in a configuration that will cause water running down walls to drip into pan. Install a freely draining wooden floor in shower pan at elevation of top of pan.
2. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
3. Separate this room from the Drying Room and Airlock with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
4. Provide splashproof entrances to Drying Room and Airlock with doors arranged in the following configuration:
 - a. At each entrance to the Shower Room construct a door frame out of nominal 2 inch x 4 inch (51 mm X 102 mm) lumber with 1-1/2 inch (39 mm) jambs (sides) and 1-1/2 inch (39 mm) head (top) and sill (bottom). Attach to this door frame two overlapping flaps of elastomeric membrane material, fastened at the head (top) and jambs (sides) (by clamping between a 1-1/2 inch (39 mm) x 3/4 inch (19mm) batten and frame). Overlap the flaps a minimum of 6 inch (152 mm) in a direction that presents a shingle-like configuration to the water stream from the shower. Overlap sill (bottom) by 1-1/2 inch (39 mm) minimum. Arrange so that any air movement out of the Work Area will cause the flaps to seal against the door frame.
5. Provide shower head and controls.
6. Provide temporary extensions of existing hot and cold water and drainage, as necessary for a complete and operable shower.
7. Provide a soap dish and a continuously adequate supply of soap and maintain in sanitary condition.
8. Arrange so that water from showering does not splash into the Changing or Equipment Rooms.
9. Arrange water shut off and drain pump operation controls so that a single individual can shower without assistance from either inside or outside of the Work Area.
10. Provide flexible hose shower head.
11. Pump waste water to drain or to storage for use in amended water. If pumped to drain, provide 20 micron and 5 micron waste water filters in line to drain or waste water storage. Change filters daily or more often if necessary. Locate filters inside shower unit so that water lost during filter changes is caught by shower pan.
12. Provide hose bib.

DELETE BELOW IF NO DECONTAMINATION DRAWING.

13. Provide all other items indicated on contract drawings.

A PERMANENT SHOWER FACILITY WITHIN THE BUILDING CAN BE UTILIZED IF IT IS SUITABLY LOCATED AND OF A CONFIGURATION WHEREBY WORKERS MAY EXIT THE WORK AREA DIRECTLY TO THE SHOWER AND THEN BY A DIFFERENT PASSAGEWAY INTO THE CHANGING AREA. CONSTRUCTION OF A PLASTIC TUNNEL FROM THE WORK AREA TO THE SHOWER MAY BE NECESSARY. THIS TUNNEL IS PART OF THE WORK AREA AND CONSEQUENTLY MUST BE TREATED AS CONTAMINATED. DRAIN WATER FROM THE SHOWER MUST BE FILTERED IN THE SAME MANNER AS CALLED FOR IN THIS SPECIFICATION.

- F. Airlock:** Provide an airlock between Shower Room and Equipment Room. This is a transit area for workers. Separate this room from Equipment Room by a sheet plastic flap doorway.
1. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 2. Separate this room from the Equipment Room and Shower Room with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 3. Separate from Equipment Room by a sheet plastic flapped doorway.
- G. Equipment Room (contaminated area):** Require work equipment, footwear and additional contaminated work clothing to be left here. This is a change and transit area for workers.
1. Separate this room from the Work Area by a 6 mil (0.15 mm) polyethylene flapped doorway.
 2. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 3. Separate this room from the Shower Room and Work Area with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.

ABATEMENT WORKERS, PARTICULARLY ON A REMOVAL PROJECT, BECOME COMPLETELY COVERED WITH DEBRIS. GENERALLY THE PATH FROM THE WORK AREA TO THE SHOWER WILL BECOME OVERBURDENED WITH DEBRIS. FOR THIS REASON THE FOLLOWING CALLS FOR A FLOOR LAYER OF PLASTIC TO BE REMOVED AFTER EACH SHIFT CHANGE.

4. Provide a drop cloth layer of sheet plastic on floor in the Equipment Room for every shift change expected. Roll drop cloth layer of plastic from Equipment Room into Work Area after each shift change. Replace before next shift change. Provide a minimum of two (2) layers of plastic at all times. Use only clear plastic to cover floors.

DELETE THE FOLLOWING IF AN AIRLOCK IS NOT DESIRED AND IS NOT REQUIRED BY LOCAL REGULATION.

- H. Airlock:** Provide an airlock between Equipment Room and Work Area. This is a transit area for workers.
1. Separate this room from Equipment Room and Work Area by a sheet plastic flapped doorways.
 2. Separate this room from the rest of the building with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
 3. Separate this room from the Equipment Room and Work Area with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.
- I. Work Area:** Separate Work Area from the Equipment Room by polyethylene barriers. If the airborne asbestos level in the Work Area is expected to be high, as in dry removal, add an intermediate cleaning space between the Equipment Room and the Work Area. Damp wipe clean all surfaces after each shift change. Provide one additional floor layer of 6 mil (0.15 mm) polyethylene per shift change and remove contaminated layer after each shift.
- J. Decontamination Sequence:** Require that all workers adhere to the following sequence when entering or leaving the Work Area.
1. Entering Work Area: Worker enters Changing Room and removes street clothing, puts on clean disposable overalls and respirator, and passes through the Shower Room into the Equipment Room.
 2. Any additional clothing and equipment left in Equipment Room needed by the worker are put on in the Equipment Room.
 3. Worker proceeds to Work Area.
- K. Exiting Work Area:**
1. Before leaving the Work Area, require the worker to remove all gross contamination and debris from overalls and feet.
 2. The worker then proceeds to the Equipment Room and removes all clothing except respiratory protection equipment.
 3. Extra work clothing such as boots, hard hats, goggles, gloves are to be stored in contaminated end of the Equipment Room.
 4. Disposable coveralls are placed in a bag for disposal with other material.
 5. Require that Decontamination procedures found in Section 01560 be followed by all individuals leaving the Work Area.

6. After showering, the worker moves to the Changing Room and dresses in either new coveralls for another entry or street clothes if leaving.

3.2 EQUIPMENT DECONTAMINATION UNIT:

- A. **Provide an Equipment Decontamination Unit** consisting of a serial arrangement of rooms, Clean Room, Holding Room, Wash Room for removal of equipment and material from Work Area. Do not allow personnel to enter or exit Work Area through Equipment Decontamination Unit.
- B. **Arrange with airlocks** between rooms as required below.
- C. **Wash Down Station:** Provide an enclosed Shower Unit located in Work Area just outside Wash Room as an equipment, bag and container cleaning station.

CONSIDER EXTENDING WATERPROOF FLOOR IN DIRECTION OF TRAVEL

1. Fabricate waterproof floor extending 6 feet (1.83 m) beyond Wash Down station in all directions. Install seamless waterproof membrane over area and extend over curbs on all four sides. Form curbs from 2 inch x 4 inch (51 X 102 mm) lumber laid on the flat.
2. Waterproof membrane is to be fabricated from elastomeric membrane.

DELETE EITHER ABOVE OR BELOW DEPENDING UPON CONSTRUCTION TO BE USED.

3. Waterproof membrane is to be fabricated from minimum 10 mil (.254 mm) polyethylene.
 4. Do not allow water to collect on waterproof membrane. Remove continuously with a wet vacuum or mops.
- D. **Wash Room:** provide wash room for cleaning of bagged or containerized asbestos-containing waste materials passed from the Work Area.
 1. Construct wash room of nominal 2 inch x 4 inch (51 X 102 mm) wood framing and polyethylene sheeting, at least 6 mil (0.15 mm) in thickness and located so that packaged materials, after being wiped clean, can be passed to the Holding Room.
 2. Separate this room from the Work Area by a single flapped door of 6 mil (0.15 mm) polyethylene sheeting.
 3. Provide a drop cloth layer of plastic on floor in the Wash Room for every load-out operation. Roll this drop cloth layer of plastic from Wash Room into Work Area after each

load-out. Provide a minimum of two (2) layers of plastic at all times. Use only clear plastic to cover floors.

DELETE IF NO AIRLOCK IS TO BE REQUIRED AT THIS POINT.

- E. **Airlock:** Provide an airlock between Wash Room and Holding Room. This is a transit area.
 - 1. Separate this room from adjacent spaces by a sheet plastic flapped doorway.
 - 2. Separate this room from the rest of the building and adjacent spaces with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.

- F. **Holding Room:** Provide Holding Room as a drop location for bagged asbestos-containing materials passed from the Wash Room. Construct Holding Room of nominal 2 inch x 4 inch (51 X 102 mm) wood framing and polyethylene sheeting, at least 6 mil (0.15 mm) in thickness and located so that bagged materials cannot be passed from the Wash Room through the Holding Room to the Clean Room.
 - 1. Separate this room from the adjacent rooms by flapped doors fabricated from 1/16 inch (1.59 mm) +/- thick single ply elastomeric membrane material either EPDM or Neoprene.

DELETE EITHER ABOVE OR BELOW DEPENDING UPON CONSTRUCTION TO BE USED.

- 2. Separate this room from the adjacent rooms by flap doors fabricated from 6 mil (0.15 mm) sheet plastic.

DELETE IF NO AIRLOCK IS TO BE REQUIRED AT THIS POINT.

- G. **Airlock:** Provide an airlock between Holding Room and Clean Room. This is a transit area.
 - 1. Separate this room from adjacent spaces by a sheet plastic flap doorway.
 - 2. Separate this room from the rest of the building and adjacent spaces with airtight walls fabricated of 6 mil (0.15 mm) polyethylene.

- H. **Clean Room:** provide Clean Room to isolate the Holding Room from the building exterior. If possible locate to provide direct access to the Holding Room from the building exterior.
 - 1. Erect Critical and Primary Barriers as described in Section 01526 "Temporary Enclosures" in an existing space. If no space exists construct Clean Room of 2 x 4 (51 X 102 mm) wood framing and polyethylene sheeting, at least 6 mil (0.15 mm) in thickness.
 - 2. Separate this room from the exterior by a single flap door of 6 mil (0.15 mm) polyethylene sheeting.

- I. Load-out Area:** The load-out area is the transfer area from the building to a truck or dumpster. It may be the Clean Room of the Equipment Decontamination unit or a separate room or loading dock area. Erect Critical and Primary barriers as described in Section 01526 "Temporary Enclosures" in load-out area.
1. During transfer of material from load-out area erect primary barriers as described in Section 01526 "Temporary Enclosures" as necessary to seal path from load-out area to truck or dumpster.
- J. Decontamination Sequence:** Take all equipment or material from the Work Area through the Equipment Decontamination Unit according to the following procedure:
1. At washdown station, thoroughly wet clean contaminated equipment or sealed polyethylene bags and pass into Wash Room.
 2. When passing equipment or containers into the Wash Room, close all doorways of the Equipment Decontamination Unit, other than the doorway between the Washdown Station and the Wash Room. Keep all outside personnel clear of the Equipment Decontamination Unit.
 3. Once inside the washroom, wet clean the bags and/or equipment.
 4. When cleaning is complete pass items into Holding Room. Close all doorways except the doorway between the Holding room and the Clean Room.
 5. Workers from the building exterior enter Holding Area and remove decontaminated equipment and/or containers for disposal.
 6. Require these workers to wear full protective clothing and appropriate respiratory protection.
 7. At no time is a worker from an uncontaminated area to enter the enclosure when a removal worker is inside.

3.3 CONSTRUCTION OF THE DECONTAMINATION UNITS:

- A. Walls and Ceiling:** Construct airtight walls and ceiling using polyethylene sheeting, at least 6 mil (0.15 mm) in thickness. Attach to existing building components or a temporary framework.
- B. Floors:** Use 2 layers (minimum) of 6 mil (0.15 mm) polyethylene sheeting to cover floors in all areas of the Decontamination Units. Use only clear plastic to cover floors.
- C. Flap Doors:** Fabricated from three (3) overlapping sheets with openings a minimum of three feet (3') (0.91 meters) wide. Configure so that sheeting overlaps adjacent surfaces. Weights at

bottom of sheets as required so that they quickly close after being released. Put arrows on sheets to indicate direction of overlap and/or travel. Provide a minimum of six feet (6') (1.22 meters) between entrance and exit of any room. Provide a minimum of three feet (3') (0.91 meters) between doors to airlocks.

- D. If the Decontamination area** is located within an area containing friable asbestos on overhead ceilings, ducts, piping, etc., provide the area with a minimum 1/4 inch (6.4 mm) hardboard or 1/2 inch (12.7 mm) plywood "ceiling" with polyethylene sheeting, at least 6 mil (0.15 mm) in thickness covering the top of the "ceiling".
- E. Visual Barrier:** Where the Decontamination area is immediately adjacent to and within view of occupied areas, provide a visual barrier of opaque polyethylene sheeting at least 6 mil (0.15 mm) in thickness so that worker privacy is maintained and work procedures are not visible to building occupants. Where the area adjacent to the Decontamination area is accessible to the public, construct a solid barrier on the public side of the sheeting to protect the sheeting. Construct barrier with wood or metal studs covered with minimum 1/4 inch (6.4 mm) thick hardboard or 1/2 inch (12.7 mm) plywood. Where the solid barrier is provided, sheeting need not be opaque.
- F. Alternate methods** of providing Decontamination facilities may be submitted to the Designer for approval. Do not proceed with any such method(s) without written authorization of the Designer.
- G. Electrical:** Provide subpanel at Changing Room to accommodate all removal equipment. Power subpanel directly from a building electrical panel.
 - 1.** Connect all electrical branch circuits in Decontamination unit and particularly any pumps in shower room to a ground-fault circuit protection device.

3.4 CLEANING OF DECONTAMINATION UNITS:

- A. Clean debris and residue** from inside of Decontamination Units on a daily basis or as otherwise indicated on Contract Drawings. Damp wipe or hose down all surfaces after each shift change. Clean debris from shower pans on a daily basis.

IF THE CLEAN ROOM BECOMES CONTAMINATED, THERE IS NO PLACE FOR THE PEOPLE CLEANING IT TO DECONTAMINATE. THE FOLLOWING SPECIFIES A PROCEDURE.

- B. If the Changing Room** of the Personnel Decontamination Unit becomes contaminated with asbestos-containing debris, abandon the entire Decontamination Unit and erect a new

Decontamination Unit. Use the former Changing Room as an inner section of the new Equipment Room.

3.5 SIGNS:

- A. Post** an approximately 20 inch by 14 inch (508 mm x 356 mm) manufactured caution sign at each entrance to the Work Area displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926:

REVISE THE FOLLOWING AS REQUIRED BY LOCAL CONDITIONS.

- 1. Provide signs in both English and Spanish.
- 2. Legend:

DANGER

ASBESTOS

CANCER AND LUNG DISEASE HAZARD

AUTHORIZED PERSONNEL ONLY

RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA
- 3. Provide spacing between respective lines at least equal to the height of the respective upper line.

FOLLOWING IS NOT REQUIRED BY OSHA BUT IS USEFUL ADVICE.

- B. Post** an approximately 10 inch by 14 (254 mm x 356 mm) inch manufactured sign at each entrance to each Work Area displaying the following legend with letter sizes and styles of a visibility at least equal to the following:

REVISE THE FOLLOWING AS REQUIRED BY LOCAL CONDITIONS.

- 1. Provide signs in both English and Spanish.

2. Legend

Notation

NO FOOD, BEVERAGES OR TOBACCO PERMITTED

3/4 inch (19 mm) Block

ALL PERSONS SHALL DON PROTECTIVE
CLOTHING (COVERINGS) BEFORE
ENTERING THE WORK AREA

3/4 inch (19 mm) Block

ALL PERSONS SHALL SHOWER IMMEDIATELY
AFTER LEAVING WORK AREA AND BEFORE
ENTERING THE CHANGING AREA

3/4 inch (19 mm) Block

END OF SECTION - 01563

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SECTION 01601 - MATERIALS AND EQUIPMENT - ASBESTOS ABATEMENT

BASED ON SECTION 01600 "MATERIALS AND EQUIPMENT" FROM MASTERSPEC® TEXT COPYRIGHTED IN 1994 BY AIA, THE AMERICAN INSTITUTE OF ARCHITECTS.

THIS SECTION USES THE TERM DESIGNER. CHANGE THIS TERM AS NECESSARY TO MATCH THE ACTUAL TERM USED TO IDENTIFY THE DESIGN PROFESSIONAL AS DEFINED IN THE GENERAL AND SUPPLEMENTARY CONDITIONS.

THIS SECTION HAS BEEN COMPLETELY REVISED TO REFLECT THE CHANGES OF THE REVISED CORRESPONDING MASTERSPEC SECTION.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
- B. **Related Sections:** The following Sections contain requirements that relate to this Section:
 - 1. The Contractor's Construction Schedule is included under Section 01043 Coordination - Asbestos Abatement.
 - 2. The Contractor's Schedule of Submittals is included under Section 01301 Submittals - Asbestos Abatement.
 - 3. The applicability of industry standards to products specified is included under Section 01097 Reference Standards and Definitions - Asbestos Abatement.
 - 4. The administrative procedures for handling requests for substitutions made after award of the Contract is included under Section 01632 Substitutions - Asbestos Abatement.

1.3 DEFINITIONS

ALWAYS RETAIN THIS ARTICLE. THESE DEFINITIONS REFER SPECIFICALLY TO THE CONTENTS OF THIS SECTION ARE NOT REPEATED IN DIVISION 1 SECTION "DEFINITIONS AND STANDARDS - ASBESTOS ABATEMENT."

A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.

1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
2. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, that is current as of the date of the Contract Documents.

DELETE SUBPARAGRAPH BELOW UNLESS PROVISIONS IN "QUALITY ASSURANCE" ARTICLE LIMIT THE USE OF FOREIGN PRODUCTS

3. "Foreign Products" as distinguished from "domestic products," are items substantially manufactured (50 percent or more of value) outside the United States and its possessions. Products produced or supplied by entities substantially owned (more than 50 percent) by persons who are not citizens of, nor living within, the United States and its possessions are also considered to be foreign products.
4. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
5. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

NORMAL DELETE THE FOLLOWING FOR ASBESTOS ABATEMENT PROJECTS. INCLUDE ONLY IF THE PROJECT INVOLVES THE INSTALLATION OF NEW EQUIPMENT AS PART OF THE WORK.

6. "Equipment" are products that may be either operational or fixed.
 - a. Operational Equipment are products with operating parts, whether motorized or manually operated, that requires temporary or permanent service connections, such as wiring or piping.
 - b. Fixed Equipment are products necessary for accomplishing the work that are used as a temporary facility during the work and removed afterward.

1.4 SUBMITTALS

ARTICLE 5.2.1 OF AIA DOCUMENT A201 REQUIRES CONTRACTOR TO FURNISH A LIST OF PROPOSED SUBCONTRACTORS AND SUPPLIERS. AIA DOCUMENT A511 SUGGESTS EXPANSION OF THIS REQUIREMENT TO INCLUDE MFRS AND INSTALLERS.

SELECT ONE OF THE OPTIONAL PARAGRAPHS BELOW. REVISE AS APPROPRIATE TO SUIT PROJECT.

USUALLY RETAIN THE PARAGRAPH BELOW IF THE PROJECT INVOLVES ONLY ASBESTOS REMOVAL WITHOUT INSTALLATION OF NEW FINISHES. THIS SHOULD BE SUFFICIENT FOR MOST ASBESTOS REMOVAL PROJECTS THAT DO NOT INVOLVE REPLACEMENT OF REMOVED MATERIALS.

Required submittals: A general listing of products requiring submittals is included at the end of Section 01301 "Submittals." This listing may not be complete. Submittal requirements are found in each specification section. Prepare a schedule in tabular form showing each product listed. Include the manufacturer's name and proprietary product names for each item listed.

IF THE PROJECT INCLUDES ENCLOSURE, OR INSTALLATION OF NEW FINISHES, USUALLY RETAIN THE PARAGRAPH BELOW, AND INCLUDE A LIST OF PRODUCTS TO BE INCLUDED IN PRODUCT LIST AT THE END OF THE SECTION. THIS SHOULD BE SUFFICIENT FOR MOST ASBESTOS ABATEMENT PROJECTS THAT DO NOT INVOLVE REPLACEMENT OF REMOVED MATERIALS.

A. Product List: A list of products required is included at the end of this Section. Prepare a schedule in tabular form showing each product listed. Include the manufacturer's name and proprietary product names for each item listed.

RETAIN PARAGRAPH BELOW ONLY WHEN CONTRACTOR IS RESPONSIBLE FOR PREPARING PRODUCT LIST AND A LIST OF PRODUCTS IS NOT INCLUDED AT THE END OF THE SECTION.

B. Product List: Prepare a list showing products specified in tabular form acceptable to the Owner's representative. Include generic names of products required. Include the manufacturer's name and proprietary product names for each item listed.

1. Coordinate product list with the Contractor's Construction Schedule and the Schedule of Submittals.

RETAIN SUBPARAGRAPH BELOW ONLY IF SPECIFIC DATA ARE REQUIRED ON EACH ITEM.

2. Form: Prepare product list with information on each item tabulated under the following column headings:

DELETE HEADINGS THAT ARE UNNECESSARY FOR PROJECT. ADD HEADINGS AS NECESSARY.

- a. Related Specification Section number.
- b. Generic name used in Contract Documents.
- c. Proprietary name, model number, and similar designations.

- d. Manufacturer's name and address.
- e. Supplier's name and address.
- f. Installer's name and address.
- g. Projected delivery date or time span of delivery period.

DELETE SUBPARAGRAPH BELOW IF A PRODUCT LIST IS INCLUDED AT THE END OF THIS SECTION. AN INITIAL SUBMITTAL SHOULD BE UNNECESSARY. IF RETAINING, REVISE THE TIME FOR COORDINATION WITH OTHER SUBMITTALS. VARIATIONS SHOWN IN LIST USUALLY REQUIRE A CHANGE ORDER.

- 3. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of an initial product list. Provide a written explanation for omissions of data and for known variations from Contract requirements.

REVISE SUBPARAGRAPH BELOW TO SUIT PROJECT.

- a. At the Contractor's option, the initial submittal may be limited to product selections and designations that must be established early in the Contract period.

RETAIN SUBPARAGRAPH BELOW. REVISE THE TIME FOR COORDINATION WITH OTHER SUBMITTALS. VARIATIONS SHOWN IN LIST USUALLY REQUIRE A CHANGE ORDER.

- 4. Completed List: Within 60 days after date of commencement of the Work, submit 3 copies of the completed product list. Provide a written explanation for omissions of data and for known variations from Contract requirements.

USUALLY RETAIN SUBPARAGRAPH BELOW. CHANGE REVIEW PERIOD TO SUIT PROJECT.

- 5. Designer's Action: The Designer will respond in writing to Contractor within 2 weeks of receipt of the completed product list. No response within this period constitutes no objection to listed manufacturers or products but does not constitute a waiver of the requirement that products comply with Contract Documents. The Owner's representative's response will include a list of unacceptable product selections, containing a brief explanation of reasons for this action.

ADD OTHER ELEMENTS TO THE PRODUCT LIST AS NECESSARY TO SUIT PROJECT.

GENERALLY RETAIN THE FOLLOWING ARTICLE

1.5 QUALITY ASSURANCE

- A.** Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.

DELETE SUBPARAGRAPH BELOW UNLESS THE SUPPLY OF SOME OF THE PRODUCTS SPECIFIED MIGHT BE LIMITED. IT IS NOT ADVISABLE TO SPECIFY PRODUCTS KNOWN TO BE IN LIMITED SUPPLY, UNLESS A FIRM COMMITMENT TO ORDER OR PURCHASE HAS BEEN MADE. SUCH A COMMITMENT TO ORDER OR PURCHASE IS BEST SPECIFIED IN DIVISION 1 SECTION "SUMMARY OF WORK." INCLUDE A NOTICE OF POSSIBLE LIMITED AVAILABILITY WITH OTHER REQUIREMENTS IN THE APPROPRIATE SECTION.

- 1.** When specified products are available only from sources that do not, or cannot, produce a quantity adequate to complete project requirements in a timely manner, consult with the Owner's representative to determine the most important product qualities before proceeding. Qualities may include attributes, such as visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources producing products that possess these qualities, to the fullest extent possible.

PARAGRAPH BELOW CONTAINS A REQUIREMENT THAT COULD BE CONSIDERED PART OF PROJECT COORDINATION.

- B.** Compatibility of Options: When the Contractor is given the option of selecting between 2 or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

INCLUDE THE FOLLOWING IF THERE MAY BE A COMPATIBILITY PROBLEMS. THIS COULD HAPPEN, FOR EXAMPLE IF THERE IS AN INCOMPATIBILITY BETWEEN A LOCK BACK SEALER AND LATER INSTALLATION OF A REPLACEMENT MATERIAL. FIREPROOFING MATERIALS IN PARTICULAR ARE USUALLY NOT TESTED OR RATED FOR APPLICATION OVER A LOCK BACK SEALER. THE AREAS OF POTENTIAL INCOMPARABILITY SHOULD BE IDENTIFIED AND MATERIAL SELECTION SHOULD SPECIFICALLY AVOID INCOMPATIBILITY.

- 1.** The contractor is responsible for providing products and construction methods that are compatible with products and construction methods to be installed after completion of the work of this contract.
 - 2.** If a dispute arises between contractors over concurrently selectable, but incompatible products, the Designer will determine which products shall be retained and which are incompatible and must be replaced.

GENERALLY DELETE PARAGRAPH BELOW. IT CONTAINS A LIMITATION DESIRED BY SOME OWNERS BUT DIFFICULT TO ENFORCE. REVIEW REQUIREMENTS WITH OWNER'S LEGAL COUNSEL.

- C.** Foreign Product Limitations: Except under one or more of the following conditions, provide domestic products, not foreign products, for inclusion in the Work:

ADD EXCEPTIONS AS NECESSARY TO SUIT PROJECT.

- 1.** No available domestic product complies with the Contract Documents.

2. Domestic products that comply with the Contract Documents are available only at prices or terms substantially higher than foreign products that comply with the Contract Documents.

GENERALLY DELETE BELOW UNLESS EQUIPMENT WITH A NAMEPLATE IS TO BE INSTALLED AS PART OF THE PROJECT. BELOW IMPOSES STRICT DESIGN CONTROL REQUIREMENTS. THESE REQUIREMENTS ARE AN EXTRA COST BUT ARE OFTEN DESIRABLE.

- D. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on the exterior.
 1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
 2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:

MODIFY LIST BELOW AS NECESSARY TO SUIT PROJECT, OR PROVIDE ADDITIONAL INFORMATION.

- a. Name of product and manufacturer.
- b. Model and serial number.
- c. Capacity.
- d. Speed.
- e. Ratings.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

GENERALLY RETAIN THIS ARTICLE

THIS ARTICLE ELIMINATES THE NEED TO INCLUDE THIS INFORMATION IN EACH SECTION IN DIVISIONS 2 THROUGH 16. LIMIT USE OF THIS ARTICLE IN EACH SECTION TO UNUSUAL REQUIREMENTS.

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

DELETE SUBPARAGRAPHS BELOW THAT ARE UNNECESSARY. INSERT SUBPARAGRAPHS AS NECESSARY TO SATISFY SPECIAL PROJECT REQUIREMENTS.

1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
7. Store products subject to damage by the elements above ground, under cover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

METHODS OF SPECIFYING USED LIMIT OPTIONS AVAILABLE TO CONTRACTOR FOR PRODUCT SELECTION. THIS ARTICLE DEFINES PROCEDURES GOVERNING PRODUCT SELECTION.

REVISE AND EXPAND PARAGRAPH BELOW AS NECESSARY TO SUIT PROJECT.

- A. General Product Requirements:** Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.

AMPLIFY PARAGRAPH ABOVE BY INSERTING SUBPARAGRAPHS SIMILAR TO THE EXAMPLES BELOW.

1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.

2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.

B. Product Selection Procedures: The Contract Documents and governing regulations govern product selection. Procedures governing product selection include the following:

RETAIN SUBPARAGRAPH BELOW WHEN SPECIFICATIONS CONTAIN EXAMPLES OF PROPRIETARY SPECIFICATIONS (CLOSED PROPRIETARY, SINGLE PRODUCT SPECIFICATIONS AS DESCRIBED IN CSI'S "MANUAL OF PRACTICE"). REVISE IF PROJECT CONDITIONS PERMIT CONSIDERATION OF SUBSTITUTIONS.

1. Proprietary Specification Requirements: Where Specifications name only a single product or manufacturer, provide the product indicated. No substitutions will be permitted.

RETAIN SUBPARAGRAPH BELOW WHEN SPECIFICATIONS CONTAIN EXAMPLES OF SEMIPROPRIETARY SPECIFICATIONS (CLOSED PROPRIETARY, OPTIONAL PRODUCT SPECIFICATIONS AS DESCRIBED IN CSI'S "MANUAL OF PRACTICE"). REVISE IF PROJECT CONDITIONS PERMIT CONSIDERATION OF SUBSTITUTIONS.

2. Semiproprietary Specification Requirements: Where Specifications name 2 or more products or manufacturers, provide 1 of the products indicated. No substitutions will be permitted.

DELETE SUBPARAGRAPH BELOW. RETAIN ONLY WHEN PROJECT REQUIRES USE OF A TERM SIMILAR TO "OR EQUAL" WHEN PRODUCTS ARE SPECIFIED BY NAME. SUBPARAGRAPH BELOW PROVIDES THE MAXIMUM CONTROL POSSIBLE OVER USE OF THIS TYPE OF SPECIFICATION.

- a. Where Specifications specify products or manufacturers by name, accompanied by the term "or equal" or "or approved equal," comply with the Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.

RETAIN SUBPARAGRAPH BELOW ONLY WHEN "AVAILABLE PRODUCTS" OR "AVAILABLE MANUFACTURER" PARAGRAPHS ARE USED. NOTE: THIS IS NOT A METHOD OF SPECIFYING. IT SHOULD NOT BE USED UNLESS SPECIFICATIONS ALSO ESTABLISH PERFORMANCE REQUIREMENTS OR REQUIRE COMPLIANCE WITH AN INDUSTRY STANDARD OR SOME OTHER METHOD TO ESTABLISH PRODUCT REQUIREMENTS.

3. Nonproprietary Specifications: When Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.

RETAIN SUBPARAGRAPH BELOW WHEN SPECIFICATIONS CONTAIN EXAMPLES OF DESCRIPTIVE SPECIFICATIONS.

4. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade

name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.

RETAIN SUBPARAGRAPH BELOW WHEN SPECIFICATIONS CONTAIN EXAMPLES OF PERFORMANCE SPECIFICATIONS.

- 5. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by the manufacturer for the application indicated.
 - a. Manufacturer's recommendations may be contained in published product literature or by the manufacturer's certification of performance.

USUALLY RETAIN SUBPARAGRAPH BELOW. MOST SPECIFICATIONS CONTAIN EXAMPLES OF PRODUCTS THAT REQUIRE COMPLIANCE WITH SOME RECOGNIZED STANDARDS, CODES, OR REGULATIONS.

- 6. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.

GENERALLY DELETE FOLLOWING FOR ASBESTOS REMOVAL PROJECTS, RETAIN FOR ENCLOSURE OR ENCAPSULATION PROJECTS WHEN CONTRACT DOCUMENTS REQUIRE MATCHING AN ESTABLISHED SAMPLE. MODIFY TO SUIT PROJECT.

- 7. Visual Matching: Where Specifications require matching an established Sample, the Designer's decision will be final on whether a proposed product matches satisfactorily.
 - a. Where no product available within the specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category.

SUBPARAGRAPH BELOW DESCRIBES PROCEDURES GOVERNING VISUAL SELECTION. MODIFY AS NECESSARY TO SUIT PROJECT.

- 8. Visual Selection: Where specified product requirements include the phrase "... as selected from manufacturer's standard colors, patterns, textures ..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Designer will select the color, pattern, and texture from the product line selected.

DELETE SUBPARAGRAPH BELOW IF ALLOWANCES ARE NOT INCLUDED OR DO NOT GOVERN PRODUCT SELECTION.

- 9. Allowances: Refer to individual Specification Sections and "Allowance" provisions in Division 1 for allowances that control product selection and for procedures required for processing such selections.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS

GENERALLY RETAIN THIS ARTICLE

- A. **Comply with manufacturer's instructions and recommendations** for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

INSERT INSTALLATION REQUIREMENTS NECESSARY TO SUIT PROJECT. .

IF A REFERENCE TO AN INCLUDED "LIST OF PRODUCTS" WAS RETAINED, INCLUDE THIS LIST HERE.

END OF SECTION 01601

SECTION 01632 - SUBSTITUTIONS - ASBESTOS ABATEMENT

BASED ON SECTION 01631 "SUBSTITUTIONS" FROM MASTERSPEC® TEXT COPYRIGHTED IN 1994 BY AIA, THE AMERICAN INSTITUTE OF ARCHITECTS.

THIS SECTION HAS BEEN COMPLETELY REVISED TO REFLECT THE CHANGES OF THE REVISED CORRESPONDING MASTERSPEC SECTION.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. **This Section includes** administrative and procedural requirements for handling requests for substitutions made after award of the Contract.
- B. **Related Sections:** The following Sections contain requirements that relate to the Section:

DELETE ANY OF THE FOLLOWING THAT DO NOT APPLY.

1. **Division 1 Section "Reference Standards and Definitions - Asbestos Abatement"** specifies the applicability of industry standards to products specified.
2. **Division 1 Section "Coordination - Asbestos Abatement"** specifies requirements for submitting the Contractor's Construction Schedule.
3. **Division 1 Section "Submittals - Asbestos Abatement"** specifies requirements for submitting the Submittal Schedule.
4. **Division 1 Section "Materials and Equipment - Asbestos Abatement"** specifies requirements governing the Contractor's selection of products and product options.

1.3 DEFINITIONS

RETAIN PARAGRAPH BELOW. THESE DEFINITIONS REFER SPECIFICALLY TO CONTENTS OF THIS SECTION AND ARE NOT REPEATED IN DIVISION 1 SECTION "REFERENCE STANDARDS AND DEFINITIONS - ASBESTOS ABATEMENT."

- A. **Definitions** in this Article do not change or modify the meaning of other terms used in the Contract Documents.

REVISE PARAGRAPH BELOW AS APPROPRIATE FOR MULTIPLE PRIME CONTRACTS OR SPECIAL PROJECT REQUIREMENTS.

- B. **Substitutions:** Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract are considered to be requests for substitutions. The following are not considered to be requests for substitutions:

DELETE SUBPARAGRAPH BELOW IF SUBSTITUTION REQUESTS WILL NOT BE CONSIDERED DURING THE BIDDING PERIOD. REVISE IF BIDDERS MAY PROPOSE REQUESTS FOR SUBSTITUTIONS AND SUBMIT THEM WITH THEIR BID.

1. Substitutions requested during the bidding period, and accepted by Addendum prior to award of the Contract, are included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.
2. Revisions to the Contract Documents requested by the Owner or Designer.
3. Specified options of products and construction methods included in the Contract Documents.
4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS

AIA DOCUMENT A201 DOES NOT ADDRESS SUBSTITUTION REQUESTS DIRECTLY. AIA DOCUMENT A511 SUGGESTS ADDING REQUIREMENTS TO ARTICLE 3.4 OF AIA DOCUMENT A201 FOR CONSIDERATION OF REQUESTS RECEIVED AFTER CONTRACT AWARD. PARAGRAPH AND "SUBSTITUTIONS" ARTICLE BELOW AMPLIFY REQUIREMENTS SUGGESTED BY AIA DOCUMENT A511.

REVISE THE 60-DAY PERIOD IN PARAGRAPH BELOW TO SUIT PROJECT. ON PROJECTS OF VERY SHORT DURATION IT MAY BE NECESSARY TO ALLOW REQUESTS FOR SUBSTITUTION DURING THE BIDDING PHASE.

- A. **Substitution Request Submittal:** The Designer will consider requests for substitution if received within 60 days after commencement of the Work. Requests received more than 60 days after commencement of the Work may be considered or rejected at the discretion of the Designer.
 1. Submit 3 copies of each request for substitution for consideration. Submit requests in the form and according to procedures required for change-order proposals.
 2. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.
 3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:

DELETE REQUIREMENTS BELOW THAT ARE UNNECESSARY OR INCLUDED IN THE SUPPLEMENTARY CONDITIONS. MODIFY RETAINED SUBPARAGRAPHS TO SUIT PROJECT.

- a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate contractors, that will be necessary to accommodate the proposed substitution.
- b. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.
- c. Product Data, including Drawings and descriptions of products and fabrication and installation procedures.
- d. Samples, where applicable or requested.
- e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
- f. Cost information, including a proposal of the net change, if any in the Contract Sum.
- g. The Contractor's certification that the proposed substitution conforms to requirements in the Contract Documents in every respect and is appropriate for the applications indicated.
- h. The Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.

REVISE SUBPARAGRAPH BELOW IF NECESSARY TO ALLOW MORE TIME TO PROCESS REQUESTS.

- 4. Designer's Action: If necessary, the Designer will request additional information or documentation for evaluation within one week of receipt of a request for substitution. The Designer will notify the Contractor of acceptance or rejection of the substitution within 2 weeks of receipt of the request, or one week of receipt of additional information or documentation, whichever is later. Acceptance will be in the form of a change order.
 - a. Use the product specified if the Designer cannot make a decision on the use of a proposed substitute within the time allocated.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

REVIEW THIS ARTICLE WITH THE OWNER'S LEGAL COUNSEL.

- A. **Conditions:** The Designer will receive and consider the Contractor's request for substitution when one or more of the following conditions are satisfied, as determined by the Designer. If the following conditions are not satisfied, the Designer will return the requests without action except to record noncompliance with these requirements.

DELETE OR MODIFY CONDITIONS BELOW THAT ARE NOT ACCEPTABLE. IF DESIRED, INSERT MORE RESTRICTIVE CONDITIONS TO LIMIT CONSIDERATION OF PROPOSED SUBSTITUTIONS.

1. Extensive revisions to the Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of the Contract Documents.
3. The request is timely, fully documented, and properly submitted.
4. The specified product or method of construction cannot be provided within the Contract Time.
5. The Designer will not consider the request if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.

DELETE SUBPARAGRAPH BELOW IF PROJECT DOES NOT INCLUDE AN "OR-EQUAL" CLAUSE.

6. The request is directly related to an "or-equal" clause or similar language in the Contract Documents.
7. The requested substitution offers the Owner a substantial advantage, in cost, time, energy conservation, or other considerations, after deducting additional responsibilities the Owner must assume. The Owner's additional responsibilities may include compensation to the Designer for redesign and evaluation services, increased cost of other construction by the Owner, and similar considerations.
8. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
9. The specified product or method of construction cannot be provided in a manner that is compatible with other materials and where the Contractor certifies that the substitution will overcome the incompatibility.
10. The specified product or method of construction cannot be coordinated with other materials and where the Contractor certifies that the proposed substitution can be coordinated.
11. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.

USUALLY RETAIN PARAGRAPH BELOW.

- B. The Contractor's submittal** and the Designer's acceptance of Shop Drawings, Product Data, or Samples for construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01632

SECTION 01701 - CONTRACT CLOSEOUT - ASBESTOS ABATEMENT

BASED ON SECTION 01700 "CONTRACT CLOSEOUT" FROM MASTERSPEC® TEXT COPYRIGHTED IN 1994 BY AIA, THE AMERICAN INSTITUTE OF ARCHITECTS.

THIS SECTION HAS BEEN COMPLETELY REVISED TO INCORPORATE CHANGES IN THE REVISED MASTERSPEC SECTION ON PROJECT CLOSEOUT.

THIS SECTION USES THE TERM DESIGNER. CHANGE THIS TERM AS NECESSARY TO MATCH THE ACTUAL TERM USED TO IDENTIFY THE DESIGN PROFESSIONAL AS DEFINED IN THE GENERAL AND SUPPLEMENTARY CONDITIONS.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. **This Section includes** administrative and procedural requirements for contract closeout including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project record document submittal.
 - 3. Submittal of warranties.
 - 4. Final cleaning.
- B. **Closeout requirements** for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.

1.3 SUBSTANTIAL COMPLETION

- A. **Preliminary Procedures:** Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

DELETE ITEMS FROM LIST BELOW THAT ARE NOT APPLICABLE OR MODIFY ITEMS RETAINED TO SUIT PROJECT.

- 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.
 - a. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.

- b. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
- 2. Advise the Owner of pending insurance changeover requirements.
- 3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
- 4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

DELETE SUBPARAGRAPHS BELOW IF SUBMITTAL OF THIS MATERIAL IS DELAYED UNTIL FINAL ACCEPTANCE.

- 5. Submit record drawings, maintenance manuals, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
- 6. Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of changeover in security provisions.
- 7. Complete startup testing of systems and instruction of the Owner's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.

DELETE 2 SUBPARAGRAPHS BELOW IF PROJECT DOES NOT INCLUDE THESE ITEMS OR IF THEY ARE DELAYED UNTIL FINAL ACCEPTANCE.

- 8. Complete final cleanup requirements, including touch up painting.
- 9. Touch up and otherwise repair and restore marred, exposed finishes.

MODIFY PARAGRAPH BELOW TO COMPLY WITH OFFICE POLICY AND PROJECT REQUIREMENTS.

- B. Inspection Procedures:** On receipt of a request for inspection, the Designer will either proceed with inspection or advise the Contractor of unfilled requirements. The Designer will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
 - 1. The Designer will repeat inspection when requested and assured that the Work is substantially complete.
 - 2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE

- A. Preliminary Procedures:** Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

REVISE SUBPARAGRAPHS BELOW TO MATCH THE SUPPLEMENTARY CONDITIONS.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
3. Submit a certified copy of the Designer's final inspection list of items to be completed or corrected, endorsed and dated by the Designer. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and shall be endorsed and dated by the Designer.
4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion or when the Owner took possession of and assumed responsibility for corresponding elements of the Work.
5. Submit consent of surety to final payment.
6. Submit a final liquidated damages settlement statement.

GENERALLY DELETE THE FOLLOWING. IT IS WISE TO SEEK THE ADVICE OF OWNER'S COUNSEL AND AN INSURANCE CONSULTANT.

7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

MODIFY THE NEXT PARAGRAPH TO COMPLY WITH OFFICE POLICY AND PROJECT REQUIREMENTS.

- B. Reinspection Procedure:** The Designer will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Designer.
1. Upon completion of reinspection, the Designer will prepare a certificate of final acceptance. If the Work is incomplete, the Designer will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 2. If necessary, reinspection will be repeated.

DELETE THE NEXT ARTICLE IF PROJECT USES DIVISION 1 SUPPLEMENTAL SECTION "PROJECT RECORD DOCUMENTS."

1.5 RECORD DOCUMENT SUBMITTALS

ARTICLE 3.11 OF AIA DOCUMENT A201 INCLUDES GENERAL PROVISIONS FOR RECORD DOCUMENTS. PARAGRAPHS IN THIS ARTICLE EXPAND ON THOSE REQUIREMENTS.

- A. General:** Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for the Designer's reference during normal working hours.

USE DIVISION 1 SUPPLEMENTAL SECTION "PRODUCT RECORD DOCUMENTS" WHEN SPECIAL PROCEDURES, SUCH AS CORRECTED, REPRODUCIBLE COPIES OF CONTRACT DRAWINGS, ARE REQUIRED.

- B. Record Drawings:** Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
1. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
 2. Mark new information that is important to the Owner but was not shown on Contract Drawings or Shop Drawings.
 3. Note related change-order numbers where applicable.
 4. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.

CONSIDER DELETING PARAGRAPH BELOW ON SMALL PROJECTS

- C. Record Specifications:** Maintain one complete copy of the Project Manual, including addenda. Include with the Project Manual one copy of other written construction documents, such as Change Orders and modifications issued in printed form during construction.
1. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.
 2. Give particular attention to substitutions and selection of options and information on concealed construction that cannot otherwise be readily discerned later by direct observation.
 3. Note related record drawing information and Product Data.
 4. Upon completion of the Work, submit record Specifications to the Designer for the Owner's records.

CONSIDER DELETING PARAGRAPH BELOW ON SMALL PROJECTS. IF CHANGE-ORDER PROPOSALS INCLUDE RESUBMITTAL OF UPDATED PRODUCT DATA, THE NEED TO MARK UP THE PREVIOUS SUBMITTAL IS ELIMINATED.

- D. Record Product Data:** Maintain one copy of each Product Data submittal. Note related Change Orders and markup of record drawings and Specifications.
1. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site and from the manufacturer's installation instructions and recommendations.
 2. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation.

3. Upon completion of markup, submit complete set of record Product Data to the Designer for the Owner's records.

PARAGRAPH BELOW CONTAINS REQUIREMENTS FOR HANDLING MISCELLANEOUS RECORD SUBMITTALS, SUCH AS LANDFILL RECEIPTS, LOGS, ETC. IF MORE DETAILED REQUIREMENTS ARE NECESSARY, ADD A SUMMARY OF MISCELLANEOUS RECORD SUBMITTALS.

- E. **Miscellaneous Record Submittals:** Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to the Designer for the Owner's records.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 FINAL CLEANING

DELETE OR REVISE THIS SECTION IF THE ASBESTOS ABATEMENT PROJECT IS THE DEMOLITION PORTION OF A RENOVATION PROJECT. IN THIS INSTANCE THE WORK SITE DOES NOT NEED TO BE CLEANED FOR RE-OCCUPANCY

THIS CLEANING DIFFERS FROM PROJECT DECONTAMINATION. THIS IS A GENERAL HOUSECLEANING BEFORE TURNING THE SITE BACK TO THE OWNER. DELETE THIS ARTICLE WHEN USING DIVISION 1 SUPPLEMENTAL SECTION "FINAL CLEANING" OR IF OWNERS PREFER TO USE THEIR OWN FORCES. CLEANING PROVISIONS IN THE GENERAL CONDITIONS ARE LIMITED TO RUBBISH REMOVAL AND SIMILAR ACTIVITIES.

- A. **General:** The General Conditions require general cleaning during construction. Regular site cleaning is included in Division 1 Section "Construction Facilities and Temporary Controls." The cleaning in this Section is in addition to cleaning which is part of decontamination work. This section is intended to return the facility to the Owner in presentable condition.
- B. **Cleaning:** Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

IF FINAL CLEANING IS DELAYED UNTIL FINAL ACCEPTANCE, MODIFY SUBPARAGRAPH BELOW.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.

BELOW IS A SAMPLE LIST OF FINAL-CLEANING REQUIREMENTS. MODIFY TO SUIT PROJECT. IF LIST IS EXTENSIVE, USE DIVISION 1 SUPPLEMENTAL SECTION "FINAL CLEANING."

- a. Remove labels that are not permanent labels.
- b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials.
- c. Replace chipped or broken glass and other damaged transparent materials.
- d. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
- e. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
- f. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.

The NEXT TWO PARAGRAPHS BELOW REPRESENT THE END OF WORK SPECIFIED IN DIVISION 1 SECTION "TEMPORARY FACILITIES - ASBESTOS ABATEMENT ."

- C. **Removal of Protection:** Remove temporary protection and facilities installed for protection of the Work during construction.
- D. **Compliance:** Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.
 - 1. Where extra materials of value remain after completion of associated Work, they become the Owner's property. Dispose of these materials as directed by the Owner.

END OF SECTION 01701

SECTION 01712 - CLEANING & DECONTAMINATION PROCEDURES

GENERAL COMMENTS

This section Sets forth procedures to clean up asbestos debris and dust, and procedures to decontaminate objects and rooms. This section is intended to be used with several other sections to write specifications for O&M work that is going to be hired out to an asbestos abatement contractor rather than being performed by facility maintenance staff. O&M programs are frequently structured so that work that can be accomplished while avoiding ACM is carried out by facility staff, and work that actually disturbs ACM is contracted out. NIBS publishes a manual on the design of asbestos O&M programs and work practices: *GUIDANCE MANUAL, Asbestos Operations & Maintenance Work Practices*. Refer to the NIBS O&M Manual, the introduction, and the evaluation for section 02083 for more discussion on the design of asbestos O&M programs.

- **01527 Regulated Areas:** This section provides the language for specifying the set up of a regulated area, as required by OSHA, in the area in which operations and maintenance work is to take place.
- **01528 Entry Into Controlled Areas:** Requirements for O&M activities such as entry into a space above a suspended ceiling where there is an asbestos-containing fireproofing are set forth in this section.
- **01560 Worker Protection - Repair and Maintenance:** describes the training, equipment and procedures necessary to protect workers against asbestos contamination and other work place hazards during maintenance activities. Respiratory protection is covered in the following section.
- **01562 Respiratory Protection:** Establishes

procedures and equipment for adequate protection against inhalation of airborne asbestos fibers.

The following sections are also intended to be used in securing contractor services in support of an operations and maintenance program. The specifications of the contracted portion of a typical asbestos O&M program will probably include most or all of the following sections. These sections need to be combined with the administrative specification sections and the other parts of the contract. Refer to the introduction for more information on the administrative specification sections and the necessary parts necessary for a complete set of Contract Documents.

- **01046 Cutting and Patching - Asbestos-Containing Materials:** This section describes procedures to be used if asbestos-containing materials must be cut and patched.
- **01529 Mini-enclosures and Glovebags:** Control procedures for maintenance activities that involve the disturbance of small areas of asbestos-containing materials, but for which there is no negative exposure assessment, or that involve drilling, cutting, abrading, sanding, chipping, breaking or sawing of TSI or surfacing material are set forth in this section.
- **02083 Disturbance of ACM During O&M Work:** This section is used to specify the O&M work activities for which there is a negative exposure assessment, and the work is performed in the open. Work of this section is performed in a regulated area.
- **02084 Disposal of Asbestos-Containing Waste Material:** The requirements for the proper

containing, transport and disposal of asbestos waste are set forth in this section.

- **Section 02085 Resilient Flooring Removal - Resilient Floor Covering Manufacturers' Recommended Non-Aggressive Work Practices:** This section describes the work practices for intact removal of resilient flooring, and the requirements for a negative exposure assessment for this sort of work. This section is written to be a "stand-alone" performance based specification for resilient flooring removal. It could be used to bid this work separately from

other O&M work. Revision would be required to make this section work with the other O&M sections. However, the necessary work practices can be excerpted from "Part 3-Execution" of this section and inserted in Section 02083.

- **15254 Repair of Insulation and Lagging:** Describes repair of insulation on pipes and other equipment using procedures that involve primarily bridging encapsulants and fabric reinforcing

SECTION 01712 - CLEANING AND DECONTAMINATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF THE WORK:

THIS SECTION CAN BE USED TO SPECIFY CLEANUP OF SMALL AREAS OF MATERIAL WHICH HAVE FALLEN FROM ARCHITECTURAL FINISHES OR THERMAL INSULATION SYSTEMS. OR IT CAN BE USED TO SPECIFY THE CLEANUP AND DECONTAMINATION OF AN AREA WHICH HAS BEEN SYSTEMATICALLY CONTAMINATED.

- A. **The extent** of cleaning and decontamination work is shown on the drawings.

USE THE ABOVE IF THERE ARE DRAWINGS DESCRIBING THE WORK. IF THERE ARE NO DRAWINGS PROVIDE A VERBAL DESCRIPTION OF THE WORK, SUCH AS IN THE EXAMPLE BELOW.

FOLLOWING IS AN EXAMPLE. REVISE TO SUIT PROJECT REQUIREMENTS.

- B. **The work includes** the removal of asbestos-containing debris that has fallen from the ceiling in Room no. 115 "Main Reading Room" in the Anthophyllite City Library, 239 Whitedust Drive, Anthophyllite, Anystate. The work includes:
 1. Removal and disposal of visible debris.
 2. Decontamination of carpeting in the area of the debris and for 10 feet (3.05 m) beyond any visible debris.
 3. Removal, cleaning and reshelving of books within the above area.

AS AN ALTERNATIVE TO THE ABOVE, A SCHEDULE COULD BE ATTACHED AND THE FOLLOWING LANGUAGE USED.

- C. **The work includes** decontamination of the areas indicated in the "Schedule of Decontamination Work," found at the end of this section.

1.3 RELATED WORK SPECIFIED ELSEWHERE:

DELETE THE FOLLOWING IF THIS SECTION IS BEING USED AS PART OF A REPAIR AND MAINTENANCE SPECIFICATION. SECTION 01714 WORK AREA CLEARANCE AS WRITTEN IS APPLICABLE ONLY TO LARGE SCALE ABATEMENT PROJECTS.

- A. **Work Area Clearance:** Specified in Section 01714 Work Area Clearance

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 GENERAL:

- A. **Complete the following before start of work** of this section:
 - 1. 01527 Regulated Areas
 - 2. 01562 Respiratory Protection
 - 3. 01561 Worker Protection - Repair and Maintenance

3.2 WET CLEANING:

DELETE FOLLOWING IF NO WET CLEANING IS REQUIRED. WHEREVER WET CLEANING IS REQUIRED, USE THE FOLLOWING PROCEDURES.

- A. **Accomplish wet cleaning** during decontamination with paper towels or disposable rags:
- B. **Immerse paper towel** or rag in container of amended water or dilute removal encapsulant.

IF A REMOVAL ENCAPSULANT IS USED, TEST FIRST TO INSURE THAT IT WILL NOT EITHER LEAVE A RESIDUE THAT WILL IMPEDE VISUAL INSPECTION OR BECOME GUMMY DURING CLEANING.

- C. **Wring out,**
- D. **Fold into quarters,**
- E. **Wipe surface once** and refold to a fresh face of cloth. Proceed in this manner until all available faces of paper towel or rag have been used.
- F. **Dispose of paper towel** or rag,

- G. Do not place rag back in container** to rinse out or for any other purpose. If a used towel or rag comes in contact with water, empty container and refill.
- H. Material adhered** to a surface with removal encapsulant may require the application of additional removal encapsulant to facilitate cleaning.

3.3 REMOVAL OF ASBESTOS-CONTAINING DEBRIS

FOLLOWING IS AN EXAMPLE OF A PROCEDURE USED TO CLEAN A SPACE AFTER FALLOUT OF A SMALL AMOUNT OF MATERIAL FROM A CEILING, PIPE INSULATION OR OTHER SOURCE. IF A LARGE QUANTITY OF MATERIAL IS INVOLVED, THEN THIS SECTION SHOULD BE COMBINED WITH THE FOLLOWING SECTION ON ROOM DECONTAMINATION.

- A. *Work of this Section is limited to the cleanup of a small quantity of amassed debris which has fallen from an architectural finish, fire-proofing, or thermal insulation on pipes, boilers and other equipment.***
- B. Remove asbestos-containing debris** and decontaminate the area involved using the following sequence:
 - 1. Shut down all ventilation into room.

DELETE THE FOLLOWING IF A SMALL AMOUNT OF RELATIVELY INTACT MATERIAL IS INVOLVED.

- 2. Seal entry to work area with 6 mil (0.15 mm) polyethylene. Slit polyethylene for entry. Install a flap to cover the slit automatically; tape slit closed after entry.

DELETE THE FOLLOWING TWO PARAGRAPHS IF THE AREA IS GOING TO BE SEALED OFF AND A DIFFERENTIAL PRESSURE SYSTEM INSTALLED.

- 3. Start HEPA vacuum before entering the area.
- 4. Use the HEPA vacuum to clean a path at least 6 feet (1.83 m) wide from the entry point of the work area to the site of the fallen material.
- 5. Remove all small debris with the HEPA vacuum.
- 6. HEPA vacuum surfaces of all pieces too large to be removed by the suction of the HEPA vacuum.
- 7. Pick up such pieces and place in the bottom of a 6 mil (0.15 mm) polyethylene disposal bag conforming to the requirements of Section 02084 Disposal of Regulated Asbestos-Containing Material. Place pieces in the bag without dropping and avoiding unnecessary disturbance and release of material.
- 8. Remove all remaining visible debris with HEPA vacuum.

9. HEPA vacuum an area 3 feet (0.91 m) beyond the location in which any visible debris was found in two directions each at right angles to the other.
10. Place a 6 mil (0.15 mm) polyethylene drop cloth in accordance with Section 01527, Local Area Protection, immediately on top of the HEPA vacuumed area before performing any repair work on site from which fall-out occurred.
11. HEPA vacuum the site from which material fell removing all loose material which can be removed by the vacuums suction.
12. Repair or remove remaining material.
13. HEPA vacuum ladder and/or any tools used and pass out of the work area.

DELETE FOLLOWING TWO PARAGRAPHS IF A VERY SMALL AMOUNT OF RELATIVELY INTACT MATERIAL IS INVOLVED. SOME STATES SET FORTH MINIMUM LEVELS OF MATERIAL CLEAN UP BELOW WHICH REOCCUPANCY AIR-MONITORING IS NOT REQUIRED. CONSULT STATE AND LOCAL REGULATIONS.

- C. **HEPA vacuum all surfaces** in the room starting at the top of wall and working downward to the floor. Then start at corner of floor farthest from Work Area entrance and work towards entrance.
 1. HEPA vacuum the floor using a floor attachment with rubber floor seals and adjustable floor to attachment height. Adjust the height so that the rubber seals just touch the floor if carpeted and are within 1/16 inch (1.6 mm) of hard surface floors. Vacuum the floor in parallel passes with each pass overlapping the previous by one-half the width of the floor attachment. At the completion of one cleaning vacuum the floor a second time at right angles to the first.

DELETE THE FOLLOWING IF THE SEAL ON DOOR IS DELETED.

- D. **Secure area from occupancy** until air monitoring results per Section 01714 Project Decontamination indicate that area is safe for reoccupancy.

3.4 CLEANING AND DECONTAMINATING OBJECTS

FOLLOWING IS A PROCEDURE FOR CLEANING CONTAMINATED OBJECTS. EDIT FOR PROJECT SPECIFICS.

- A. **Perform all work of decontaminating objects** wherever possible on a plastic drop sheet installed in conformance with Section 01527.
- B. **HEPA vacuum** all surfaces of object and immediate area before moving the object.

- C. **Pick-up object**, if possible, and HEPA vacuum all surfaces.
- D. **Hand to off-sheet worker** who will wet-clean object, if possible, and place in storage location.
- E. **Decontaminate area** where object was located by HEPA vacuuming twice, in two perpendicular directions. Wet clean if necessary to remove any debris.
- F. **Return object** to its original location.

3.5 DECONTAMINATION OF ROOMS:

FOLLOWING IS AN EXAMPLE OF PROCEDURES FOR CLEANING SPACES ADJACENT TO A WORK AREA WHICH HAVE BEEN CONTAMINATED BY FIBER MIGRATION, OR WHICH HAVE BEEN CONTAMINATED BY GROSS DEBRIS. AS WRITTEN THIS SECTION REQUIRES WORKER DECONTAMINATION BY SHOWERING. EDIT FOR PROJECT SPECIFICS.

- A. **Shut down all ventilation into space.**

USE THE FOLLOWING THREE PARAGRAPHS REFERRING TO SEALING THE ROOM AND INSTALLING A HEPA FILTERED FAN UNIT ONLY IF THE AIR IN THE ROOM MAY BE CONTAMINATED WITH AIRBORNE FIBERS WHICH MUST BE REMOVED AS A PART OF THE DECONTAMINATION. IN THIS CASE WORKERS SHOULD UNDERGO A WET DECONTAMINATION PROCEDURE AT THE END OF THE WORK DAY.

IF THE ROOM IS CONTAMINATED WITH VISIBLE DEBRIS (SUCH AS TRACKED MATERIAL), BUT IS NOT CONTAMINATED WITH AIRBORNE FIBERS DELETE THE NEXT THREE PARAGRAPHS. IN THIS CASE THE DRY DECONTAMINATION PROCEDURES OF SECTION 01561 SHOULD BE USED.

- B. **Seal entry to Work Area** with 6 mil (0.15 mm) polyethylene. Slit polyethylene for entry. Install a flap to cover the slit automatically; tape slit closed after entry.
- C. **Install Differential Pressure System** in accordance with Section 01513.

IF IT IS NOT FEASIBLE TO EXHAUST THE HEPA FILTERED FAN UNITS FROM THE WORK AREA, DELETE THE ABOVE AND USE THE FOLLOWING PARAGRAPH.

- D. **Recirculate HEPA filtered fan units** in space by operating them so that discharge from machine is back into room. Use one HEPA filtered fan unit for each 2,500 cubic feet (70.8 cubic meters) of room volume.
- E. **HEPA vacuum all surfaces** in the room starting at the ceiling, then top of wall and working downward to the floor.
- F. **HEPA vacuum the floor** using a floor attachment with rubber floor seals and adjustable floor to attachment height. Adjust the height so that the rubber seals just touch the floor if carpeted and are within 1/16 inch (1.6 mm) of hard surface floors. Vacuum the floor in parallel passes with

each pass overlapping the previous by one half the width of the floor attachment. At the completion of one cleaning, vacuum the floor a second time at right angles to the first.

- G. Operate HEPA filtered fan unit** in space for 96 air changes minimum.
- H. At completion of Decontamination Work** workers decontaminate in accordance with Section 01561 Worker Protection - Repair and Maintenance.
- I. Secure area from occupancy** until air monitoring results per Section 01714 Work Area Clearance indicate area is safe for reoccupancy.

END OF SECTION - 01712

SECTION 01713 - PROJECT DECONTAMINATION - MICROFIBERS

THE FOLLOWING PROCEDURE HAS PROVEN EFFECTIVE IN DECONTAMINATING AREAS WITH HIGH AIRBORNE ASBESTOS MICRO-FIBER LEVELS (FIBERS TOO SMALL TO BE SEEN WITH AN OPTICAL MICROSCOPE). TYPICALLY THESE FIBERS ARE VISIBLE ONLY WITH A TRANSMISSION ELECTRON MICROSCOPE. THIS TYPE OF CONTAMINATION IS VERY UNUSUAL AND SHOULD NOT BE CONSIDERED AS PART OF A NORMAL ABATEMENT PROJECT. AN ENVIRONMENTAL CONSULTANT FAMILIAR WITH THIS TYPE OF SITUATION SHOULD BE CONSULTED IN ADOPTING THIS SECTION TO A SPECIFIC JOB SITE. IT SHOULD BE NOTED THAT NO CURRENT FEDERAL REGULATIONS COVER MICROFIBERS.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to work of this section.

1.2 SUMMARY

FOLLOWING IS AN EXAMPLE. EDIT TO DESCRIBE WORK OF PROJECT.

- A. **DESCRIPTION OF THE WORK:** *Decontamination of the room and two adjacent rooms opening off Gymnastics Room. Work of this section is to decontaminate air and all surfaces in each room.*

1.3 AIRBORNE ASBESTOS FIBER HAZARD:

FOLLOWING IS AN EXAMPLE. EDIT FOR PROJECT SPECIFICS.

- A. **Area currently has airborne chrysotile levels between 0.6 and 0.9 fibers/cc.** *These fibers are invisible to the human eye. Supplied Air Respiratory Protection is to be used at all times in the Work Area.*

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 GENERAL:

- A. Prior to starting work**, complete requirements of:
1. Section 01513 - Temporary Pressure Differential and Air Circulation System
 2. Section 01563 - Decontamination Units (Personnel Decontamination Unit Only)
 3. Section 01526 - Temporary Enclosures (Critical Barriers Only)
 4. Section 01560 - Worker Protection - Asbestos Abatement
 5. Section 01562 - Respiratory Protection

EDIT SECTION 01526 TO REQUIRE INSTALLATION OF ONLY CRITICAL BARRIERS, AND 01563 TO REQUIRE PERSONNEL DECONTAMINATION UNIT ONLY.

3.2 CLEANING AREA:

- A. First Cleaning:** Carry out a first cleaning of all surfaces of the work area including Critical Barrier sheeting, tools, scaffolding and/or staging by use of damp-cleaning and mopping, and/or a High Efficiency Particulate Absolute (HEPA) filtered vacuum. (Note: A HEPA vacuum will fail if used with wet material.) Do not dry dust or dry sweep. Use each surface of a cleaning cloth one time only and then dispose of as contaminated waste. Continue cleaning until there is no visible dust, debris or residue on plastic sheeting or other surfaces.
- B. Perform a Complete Visual Inspection** of the entire Work Area including decontamination unit, sole barrier sheeting, seals over ventilation openings, doorways and windows, etc.) for debris from any sources, residue on surfaces, etc. If any such debris or residue is found repeat the first cleaning and continue the decontamination procedure from that point. When the Work Area is visually clean, complete the Certification at the end of this section.
- C. Allow a waiting a period** that is long enough for the HEPA-filtered fan units operating in the work area to provide 96 air changes to allow HEPA filtered fan units to clean air of airborne asbestos fibers. Use 24 inch (610 mm) diameter floor fans as necessary to assure circulation of air in all parts of Work Areas during this period. Maintain the Differential Pressure System in operation for the entire 24 hour period.
- D. Second Cleaning:** Carry out a second cleaning of all surfaces in the work area in the same manner as the first cleaning.

STEAM CLEANING OF CARPETS MAY ALSO BE EFFECTIVE PROVIDING THE CLEANING IS A CONTINUOUSLY WET ONE.

- E. Allow a waiting a period** that is long enough for the HEPA-filtered fan units operating in the work area to provide 96 air changes to clean air of airborne asbestos fibers. Use 24 inch (610 mm) diameter oscillating fans as necessary to assure circulation of air in all parts of work areas during this period. Maintain differential pressure system in operation for the entire 24 hour period.
- F. Final Cleaning:** Carry out a final cleaning of all surfaces in the Work Area in the same manner as the first cleaning.

3.3 ADDITIONAL CLEANING:

- A. **Work of the Base Bid** is completed after the final cleaning. Work from this point will be carried on as additional to the Base Bid.
- B. **First Additional Cleaning:** If airborne asbestos fiber levels within the Work Area exceed those in make-up air pursuant to Section 01714, repeat final cleaning.
 - 1. Air samples will be taken by the Owner in each Work Area at the completion of final cleaning. See Section 01714 for Work Area Clearance criteria.

IF APPLICABLE, ADD: ALL FILTERS IN THE AIR HANDLING SYSTEM(S) SHALL BE CAREFULLY REMOVED, TREATING AS CONTAMINATED MATERIAL, BAGGED AND DISPOSED OF AS CONTAMINATED WASTE.
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3.4 SHORTCYCLING HEPA FILTERED FAN UNITS:

- A. **If airborne asbestos fibers in the Work Area** still exceed those measured at the source of make up air for the HEPA filtered fan unit(s), operate HEPA filtered fan unit(s), within the Work Area with exhaust from units being returned to Work Area. Use number of units equal to twice the number called for in Section 01513. Use an extension duct or move the units to various locations in the Work Area. Continue this procedure for 192 air changes. At the end of that time final air samples will be secured. Continue this procedure until the Work Area meets clearance criteria of Section 01714 Work Area Clearance.

3.5 REMOVAL OF CRITICAL BARRIERS:

- A. **After final air samples** are found to meet Clearance Criteria remove critical barriers and completely dismantle and remove Decontamination Unit.
- B. **Seal HEPA filtered fan units** with 6 mil (0.15 mm) polyethylene sheet and duct tape to form a tight seal at intake end before unit is moved from the Work Area.

3.6 CERTIFICATE OF VISUAL INSPECTION:

- A. **Following this section is a "Certificate of Visual Inspection".** This Certification is to be completed by the Contractor and certified by the Project Administrator. Submit completed Certificate with Application for Final payment. Final payment will not be made until this Certification is executed.

END OF SECTION - 01713

CERTIFICATION OF VISUAL INSPECTION

In accordance with Section 01713 "Project Decontamination - Microfibers" the contractor hereby certifies that he has visually inspected the work area (all surfaces including pipes, beams, ledges, walls, ceiling and floor, Decontamination Unit, sheet plastic, etc.) and has found no dust, debris or residue.

by: (Signature)_____Date_____

(Print Name)_____

(Print Title)_____

PROJECT ADMINISTRATOR CERTIFICATION

The Project Administrator hereby certifies that he has accompanied the Contractor on Contractor's visual inspection and verifies that this inspection has been thorough and to the best of their knowledge and belief, the Contractor's Certification above is a true and honest one.

by: (Signature)_____Date_____

(Print Name)_____

(Print Title)_____

SECTION 02061 - BUILDING COMPONENT DEMOLITION-ASBESTOS ABATEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and Division - 1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF THE WORK

- A. **The work of this Section** includes the demolition of buildings and installations where asbestos containing materials are present.

1.3 RELATED WORK SPECIFIED ELSEWHERE:

- A. **Work to be completed prior to start of the work of this section** are set forth in the following sections:
 - 1. 01560 Worker Protection - Asbestos abatement
 - 2. 01562 Respiratory Protection
 - 3. 01563 Decontamination Units
- B. **Section 02084 Disposal of Regulated Asbestos-Containing Material** describes the handling and disposal of asbestos-containing waste.
- C. **Section 02086 Hazardous Waste Management** describes the management and disposal of hazardous waste such as PCB Ballasts, fluorescent light tubes, and mercury containing thermostats encountered during the work of this section.

1.4 SUBMITTALS:

ASBESTOS ABATEMENT WORK PRECEDING MOST DEMOLITION PROJECTS IS CARRIED OUT USING WATER WITHOUT A SURFACTANT OR REMOVAL ENCAPSULANT. INCLUDE THIS SECTION, ON SUBMITTALS, ONLY IF JOB CONDITIONS REQUIRE THE USE OF AMENDED WATER OR A REMOVAL ENCAPSULANT. IF NEITHER OF THESE IS USED, THERE WILL BE NO MATERIAL OR PRODUCT SUBMITTALS AND THE FOLLOWING CAN BE DELETED.

- A. **Before Start of Work:** Submit the following to the Designer for review. Do not start work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use.
 - 1. Surfactant: Submit product data, use instructions and recommendations from manufacturer of surfactant intended for use. Include data substantiating that material complies with requirements.

- 2. Removal Encapsulant: Submit product data, use instructions and recommendations from manufacturer of removal encapsulant intended for use. Include data substantiating that material complies with requirements.
 - 3. NESHAP Certification: Submit certification from manufacturer of surfactant or removal encapsulant that, to the extent required by this specification, the material, if used in accordance with manufacturer's instructions, will wet asbestos-containing materials (ACM) to which it is applied as required by the National Emission Standard for Hazardous Pollutants (NESHAP) Asbestos Regulations (40 CFR 61, Subpart M).
- B. Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal has been 'Received - Not Reviewed.'
- 1. Material Safety Data Sheet: Submit Material Safety Data Sheets, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for the following:
 - a. Surfactants.
 - b. Encapsulants.

PART 2 - PRODUCTS:

CONSULT WITH DESIGN TEAM BEFORE DECIDING WHETHER OR NOT TO USE AMENDED WATER OR A REMOVAL ENCAPSULANT IN WETTING MATERIAL PRIOR TO REMOVAL.

IF DEMOLITION WORK WILL BE CARRIED OUT USING WATER WITHOUT A SURFACTANT OR REMOVAL ENCAPSULANT, DELETE THE FOLLOWING PARAGRAPHS ON WETTING MATERIALS.

FOLLOWING ALLOWS THE CONTRACTOR TO USE EITHER A SURFACTANT IN WATER OR A REMOVAL ENCAPSULANT, PROVIDING THAT IT IS ABLE TO PERFORM AS WELL AS THE GENERIC MIXTURE OF 50 PERCENT POLYOXYETHYLENE ESTER AND 50 PERCENT POLYOXYETHYLENE ETHER.

2.1 MATERIALS

- A. Wetting Materials:** For wetting prior to disturbance of ACM use either amended water or a removal encapsulant:
- B. Amended Water:** Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the ACM and retardation of fiber release during disturbance of the material equal to or greater than that provided by the use of one ounce of a surfactant consisting of 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether mixed with five gallons of water.
- C. Removal Encapsulant:** Provide a penetrating type encapsulant designed specifically for removal of ACM. Use a material which results in wetting of the ACM and retardation of fiber release during disturbance of the material equal to or greater than that provided by water amended with

a surfactant consisting of 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether mixed with five gallons of water.

THE USE OF POLYETHYLENE ON DEMOLITION PROJECTS IS UNUSUAL EXCEPT FOR SEALING OPENINGS IN THE EXTERIOR BUILDING ENVELOPE. EDIT THE FOLLOWING LIST TO ELIMINATE THOSE TYPES OF PLASTIC NOT USED.

FOLLOWING IS MOST LIKELY TO BE FOUND ON THE JOB IN THE ABSENCE OF A MORE SPECIFIC REQUIREMENT.

- D. Polyethylene Sheet:** A single polyethylene film in the largest sheet size possible to minimize seams, 6.0 mil (0.15 mm) thick frosted, or black as indicated.

FOLLOWING IS GENERALLY UNNECESSARY IN A BUILDING WHICH IS ABANDONED. USE THE FOLLOWING PARAGRAPH WHERE THERE ARE POTENTIAL SOURCES OF IGNITION IN THE WORK AREA, SUCH AS CUTTING TORCHES OR SALAMANDER HEATERS. FIRE RETARDANT SHEET PLASTIC IS CONSIDERABLY MORE EXPENSIVE THAN STANDARD PLASTIC. SOME CONTRACTORS REPORT SUBSTANTIAL SAVINGS RELATED TO THE REDUCTION OF SLIP-AND-FALL ACCIDENT COSTS, FACILITATED BY THE ROUGHER TEXTURE OF FIRE-RETARDANT POLY.

- E. Polyethylene Sheet:** Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick, frosted or black as indicated.

REINFORCED PLASTIC SHOULD BE USED IN EXTERIOR APPLICATIONS WHERE THE SHEET IS EXPECTED TO BE STRESSED BY WINDS OR IN ANY LOCATION WHERE HIGH SKIN STRENGTH IS REQUIRED. FOLLOWING IS AN EXAMPLE OF LANGUAGE WHICH CAN BE USED. EDIT TO SUIT PROJECT REQUIREMENTS.

- F. Reinforced Polyethylene Sheet:** Where plastic sheet is the only separation between the Work Area and building exterior, provide translucent, nylon reinforced, laminated, flame resistant, polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick , frosted or black as indicated.
- G. Duct Tape:** Provide duct tape in 2 inch or 3 inch (51 mm or 76 mm) widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
- H. Spray Cement:** Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

PART 3 - EXECUTION

3.1 WORKER PROTECTION:

- A. **Before beginning work** with any material for which a Material Safety Data Sheet has been submitted provide workers with the required protective equipment. Require that appropriate protective equipment be used at all times.

FOLLOWING ARE PROCEDURES FOR REMOVAL OF ACM FROM ABANDONED BUILDINGS WHICH ARE TO BE DEMOLISHED. SPECIFICATION SECTIONS ON WORKER PROTECTION, DECONTAMINATION UNITS, AND RESPIRATORY PROTECTION ARE NECESSARY. THIS SECTION IS INTENDED TO REPLACE THE TEMPORARY ENCLOSURE PROJECT DECONTAMINATION, REMOVAL OF ASBESTOS CONTAINING MATERIALS AND WORK AREA CLEARANCE SECTIONS.

3.2 REMOVAL OF ARCHITECTURAL FINISHES, FIREPROOFING, AND THERMAL SYSTEM INSULATION:

IN BUILDING DEMOLITION PROJECTS IT IS UNNECESSARY TO PROTECT BUILDING FINISHES. AS SUCH, THE PRIMARY AND SECONDARY BARRIERS FOUND ON A TYPICAL ABATEMENT PROJECT ARE UNNECESSARY. THE CRITICAL BARRIER ISOLATION IS ACCOMPLISHED BY USING EXISTING BUILDING ELEMENTS SUCH AS WALLS, WINDOWS AND DOORS. SHEET PLASTIC IS REQUIRED ONLY WHERE ONE OF THESE BUILDINGS ELEMENTS IS INCOMPLETE OR MISSING.

- A. **Isolate Work Area:** from the building exterior and other portions of the building. Where existing walls, doors, windows, or other such closure is missing, seal openings with polyethylene sheet at least 6 mil (0.15 mm) in thickness, mechanically fastened in place and sealed with duct tape or spray glue. Seal broken windows or other openings to the building exterior with nylon-reinforced plastic.

FOLLOWING MAKES THE USE OF A DROP CLOTH LAYER, AN OPTION THE CONTRACTOR CAN USE IF IT WILL SIMPLIFY CLEAN UP.

NORMALLY A DROP CLOTH LAYER OF PLASTIC IS UNNECESSARY IN A BUILDING DEMOLITION PROJECT. HOWEVER, OSHA REQUIRES DROP CLOTHS FOR ALL LARGE CLASS I JOBS.

SELECT ONE OF THE FOLLOWING PARAGRAPHS. USE THE FIRST PARAGRAPH FOR CLASS II AND CLASS I JOBS WITH LESS THAN 25 LINEAR OR 10 SQUARE FEET (7.5 LINEAR METERS OR 3 SQUARE METERS) OF TSI OR SURFACING MATERIAL. USE THE SECOND PARAGRAPH FOR CLASS I JOBS WITH MORE THAN 25 LINEAR OR 10 SQUARE FEET (7.5 LINEAR METERS OR 3 SQUARE METERS) OF TSI OR SURFACING MATERIAL.

- B. **Drop Cloth:** At the Contractor's option a drop cloth consisting of clear 6 mil (0.15 mm) sheet plastic may be installed in any area where asbestos removal work is to be carried out.
- C. **Drop Cloth:** Install a drop cloth consisting of clear 6 mil (0.15 mm) sheet plastic in any area where asbestos removal work is to be carried out.
- D. **Adequately wet ACM** to be removed prior to stripping and/or tooling to reduce fiber dispersal into the air. Accomplish wetting by a fine spray (mist) of water, amended water or removal encapsulant. Saturate material sufficiently to wet to the substrate without causing excess dripping. Allow time for water, amended water or removal encapsulant to penetrate material thoroughly. If water or 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 instructions. Perforate outer covering of any installation which has been painted and/or jacketed in order to allow penetration of water, amended water or removal encapsulant, or where necessary, carefully strip away while simultaneously wetting the installation to minimize dispersal of asbestos fibers into the air.

- E. Remove Saturated ACM** in small sections from all areas. Scrape materials from substrate and remove residue using nylon bristled hand brush or high pressure washer. Remove materials in manageable quantities and control the descent to staging or floor below. If height is over 20' use drop chute to contain material during descent. If using water or amended water spray mist continuously during work process. Do not allow material to dry out. As it is removed, simultaneously pack material while still wet into disposal bags. Seal bags, clean outside and move to washdown station adjacent to Material Decontamination Unit.
- F. At Completion of Removal Work:** Clean all surfaces in the removal area by wet wiping, HEPA vacuuming or washing down with hoses. Clean from top down. At Contractor's option a proportional feed nozzle may be used to add a surfactant to the water. Collect any water runoff and filter through a dual filtration system. Provide first filter that removes fibers 20 microns and larger, and a final filter that removes all fibers 5 microns and larger.
- G. Visual Inspection:** Visually inspect work area for debris. If any visible debris is noted, clean all surfaces in the Work Area again. Continue this procedure until no visible debris is found in the Work Area.
- H. Final Air Testing:** If the Work Area is to remain unoccupied prior to demolition or be occupied only by workers wearing the proper respiratory protection then final air testing is unnecessary. If the area is to be occupied prior to demolition clear the Work Area in accordance with requirements of section 01711 Project Decontamination.

3.3 HAZARDOUS WASTE MANAGEMENT AND DISPOSAL.

IF THE WORK INVOLVES THE DEMOLITION AND DISPOSAL OF HAZARDOUS WASTE, INCLUDE THIS ARTICLE AND SECTION 02086 HAZARDOUS WASTE MANAGEMENT.

- A. Manage and dispose of hazardous waste** such as PCB ballasts, fluorescent light tubes, and mercury thermostats in accordance with the requirements of Section 02086 - Hazardous Waste Management.
- B. Do not mix potentially hazardous waste streams.** Where feasible, separate each type of hazardous waste from other types of hazardous wastes, from asbestos waste and from construction waste.
- C. Segregate, package, label, transport and dispose** of Hazardous Waste in accordance with DOT, EPA, State and Local regulations.

3.4 DISPOSAL OF WASTE:

- A. Pack:** All asbestos-containing or contaminated waste material in bags marked as required by Section 02084 Disposal of Regulated Asbestos-Containing Material.

FOLLOWING IS A PROCEDURE FOR REMOVING COMPLETE SYSTEMS SUCH AS PIPING WHICH IS BEING REMOVED COMPLETE WITH ASBESTOS CONTAINING INSULATION.
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3.5 REMOVAL OF COMPLETE SYSTEMS:

- A. Before Starting Work of This Section:** Complete the work set forth in the following specification sections:
 - 1.** Section 01527 Local Area Protection
 - 2.** Section 01561 Worker Protection - Repair and Maintenance
 - 3.** Section 01562 Respiratory Protection
- B.** Completely Seal all components to be removed in 6 mil (0.15 mm) polyethylene sheet sealed with duct tape. Candy stripe surface of plastic as reinforcement. Wrap large items such as boilers, tanks, and converters with nylon reinforced sheet plastic. Install sheet plastic to allow cutting of components into sections where this is necessary for the work.
- C.** Remove ACM where necessary to allow the cutting components into sections using the procedures set forth in Section 01529 "Mini Enclosures and Glovebags" of these Specifications.
- D.** Remove Components: In largest sections possible.

END OF SECTION - 02061

SECTION 02062 - NON-ASBESTOS DEMOLITION

PART 1 - GENERAL

THIS SECTION ADDRESSES THE REMOVAL OF NON-ASBESTOS AND NON-CONTAMINATED MATERIALS PRIOR TO THE START OF ASBESTOS ABATEMENT ACTIVITIES.

IN MANY INSTANCES THE ASBESTOS ABATEMENT CONTRACTOR WILL BE THE DEMOLITION CONTRACTOR FOR A RENOVATION.

1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. **Extent of non-asbestos selective demolition** work is indicated on drawings.

FOLLOWING IS LIST OF "EXAMPLES" ONLY. MODIFY EXAMPLES OR ADD SPECIFIC ITEMS OF DEMOLITION OR SALVAGE TO SUIT PROJECT.

THIS ARTICLE REQUIRES THAT THE MATERIALS BE TESTED PRIOR TO THE WORK SO THAT THE CONTRACTOR CAN BE NOTIFIED OF THE LOCATION OF ASBESTOS CONTAINING AND NON-ASBESTOS CONTAINING ASSEMBLIES.

- B. **Non-Asbestos Demolition Work:** Non-asbestos demolition requires the selective removal and subsequent off site disposal of the following non- asbestos containing installations:
 1. *Portions of building structure indicated on drawings and as required to accommodate new construction*
 2. *Removal of interior demountable partitions as indicated on drawings*
 3. *Removal of concrete masonry partitions as indicated on drawings*
 4. *Removal of doors and frames indicated "remove"*
 5. *Removal of built-in casework indicated "remove"*
 6. *Removal of existing windows indicated to be bricked-in*
 7. *Removal and protection of existing fixtures and equipment items indicated "salvage"*

C. Decontaminated Materials: The following materials are to be decontaminated in work of other sections. These decontaminated materials are to be disposed of as work of this section.

1. *Ceiling tiles*
2. *Ceiling suspension system*
3. *Metal framing from drywall partitions*
4. *Wood framing from drywall partitions*
5. *Piping and conduit*

D. Asbestos-Containing Materials (ACM): The following are asbestos-containing or asbestos-contaminated installations which are not to be disturbed during work of this section:

THIS SECTION SHOULD IDENTIFY ACM LIKELY TO BE DISTURBED BY DEMOLITION WORK.

FOLLOWING ARE EXAMPLES. EDIT TO SUIT PROJECT SPECIFICS.

1. *Vinyl asbestos floor tile*
2. *Drywall partitions*
3. *Acoustical plaster in auditorium and corridors*
4. *Carpeting in auditorium and corridors*
5. *Fireproofing above suspended ceilings in all office areas*

GENERALLY DELETE THE FOLLOWING UNLESS THE ABATEMENT CONTRACTOR IS PROVIDING RENOVATION WORK.

E. Removal work specified elsewhere:

1. *Roofing removal is specified in Division 7.*
2. *Cutting non-structural concrete floors and masonry walls for underground piping and ducts, and for above grade piping, ducts, and conduit is included with the work of the respective mechanical and electrical Divisions 15 and 16 Specification Sections.*
3. *Cutting holes in roof deck and complete installation of new rooftop equipment is specified in Division-15.*

GENERALLY DELETE THE FOLLOWING UNLESS THE ABATEMENT CONTRACTOR IS PROVIDING RENOVATION WORK.

F. Related work specified elsewhere:

1. *Remodeling construction work and patching is included within the respective Sections of Specifications, including removal of materials for re-use and incorporated into remodeling or new construction.*
2. *Relocation of pipes, conduits, ducts, other mechanical and electrical work are specified by respective trades.*

1.3 RELATED WORK SPECIFIED ELSEWHERE:

- A. Section 02086 Hazardous Waste Management** describes the management and disposal of hazardous waste such as PCB Ballasts, fluorescent light tubes, and mercury containing thermostats encountered during the work of this section.

1.4 SUBMITTALS:

- A. Schedule:** Submit schedule indicating proposed methods and sequence of operations for non-asbestos demolition work to Designer for review prior to commencement of work. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection.

DELETE BELOW IF SELECTIVE DEMOLITION WILL NOT INTERFERE WITH OWNER'S OPERATIONS.

1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.

REVISE BELOW AS APPROPRIATE FOR PROJECT NEEDS.

2. Coordinate with Owner's continuing occupation of portions of existing building.

1.5 JOB CONDITIONS:

DELETE OR MODIFY BELOW TO SUIT PROJECT REQUIREMENTS.

- A. Occupancy:** Owner will be continuously occupying areas of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities which will impact Owner's normal operations.

- B. Condition of Structures:** Owner assumes no responsibility for actual condition of items or structures to be demolished.

REVIEW BELOW AND REVISE IF NECESSARY. INCLUDE LISTING OF ITEMS WHICH WILL BE REMOVED BY OWNER OR RETAINED BY OWNER BUT REMOVED BY CONTRACTOR.

1. Conditions existing at time of commencement of Contract will be maintained by Owner insofar as practicable. However, variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.

- C. Partial Demolition and Removal:** Items indicated to be removed but of salvable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.

1. Storage or sale of removed items on site will not be permitted.

REVISE BELOW TO SUIT PROJECT.

- D. Protections:** Provide temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to selective demolition work.

1. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to and from occupied portions of building.
2. Erect temporary covered passageways as required by authorities having jurisdiction.
3. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished, and adjacent facilities or work to remain.
4. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
5. Protect floors with suitable coverings when necessary.
6. Construct temporary insulated solid dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks if required.
7. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces, and installation of new construction to insure that no water leakage or damage occurs to structure or interior areas of existing building.
8. Remove protections at completion of work.

- E. **Damages:** Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.
- F. **Traffic:** Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities
 - 1. Do not close, block or otherwise obstruct streets, walks or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- G. **Explosives:** Use of explosives will not be permitted.

DELETE ABOVE OR BELOW TO SUIT PROJECT.

- H. **Explosives:** Do not bring explosives to site or use explosives without written consent of authorities having jurisdiction. Such written consent will not relieve Contractor of total responsibility for injury to persons or for damage to property due to blasting operations. Perform required blasting complying with governing regulations.
- I. **Utility Services:** Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.

DELETE BELOW IF NOT REQUIRED.

- 1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.

ADD OTHER SPECIFIC REQUIREMENTS TO SUIT PROJECT.

- J. **Environmental Controls:** Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.
 - 1. Do not use water when it may create hazardous or objectionable conditions, such as ice, flooding, or pollution.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

3.1 INSPECTION:

- A. **Prior to commencement of selective demolition work**, inspect areas in which work will be performed. Photograph existing conditions of structure, surfaces, equipment or of surrounding properties which could be misconstrued as damage resulting from selective demolition work. Submit copies of photographs to Designer prior to starting work.

3.2 PREPARATION:

- A. **Decontamination Unit:** Prior to beginning work of this Section complete installation of a Personnel Decontamination Unit as described in Section 01563 Decontamination Units.
- B. **Competent Person:** Work of this Section is to be supervised by an OSHA Competent Person as described in Section 01043 Project Coordination.
- C. **Provide interior and exterior shoring**, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.
 - 1. Cease operations and notify the Designer immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
- D. **Cover and protect furniture**, equipment and fixtures to remain from soiling or damage when demolition work is performed in rooms or areas from which such items have not been removed.
 - 1. Erect and maintain dustproof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.
 - 2. In areas where asbestos abatement work is to follow selective demolition erect barriers to control access as described in section 01562 "Temporary enclosures."

BELOW IS AN EXAMPLE. THIS WORDING IS APPROPRIATE FOR PROJECTS WHERE CONTRACTOR IS PERFORMING ALL DEMOLITION WORK, SOME OF WHICH DOES NOT PRECEDE ASBESTOS DEMOLITION. REVISE TO SUIT PROJECT. DELETE IF THERE IS NO NON-ASBESTOS ABATEMENT RELATED DEMOLITION.

- 3. Where no asbestos abatement work is to follow selective demolitions and the work is immediately adjacent to occupied portions of the building, construct dustproof partitions of minimum 4 inch (100 mm) studs, 5/8 inch (16 mm) drywall (joints taped) on occupied side, 1/2 inch (13 mm) fire-retardant plywood on demolition side, and fill partition cavity with sound-deadening insulation.
- 4. Provide weatherproof closures for exterior openings resulting from demolition work.

FOLLOWING ARE GOOD PROCEDURES FOR ANY SORT OF DEMOLITION WORK IN AN OCCUPIED BUILDING CONTAINING ACM.

- E. **Work Site Isolation:** Isolate the site of selective demolition work from occupied portions of the building prior to start of demolition activities. Work site isolation includes:

1. Erection of Critical Barriers as described in Section 01526 Temporary Enclosures
2. Installation and operation of Pressure Differential and Ventilation System as describe in Section 01513
3. Locate, identify, stub off and disconnect utility services that are not indicated to remain
4. Provide by-pass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shutdown of service is necessary during change-over.

3.3 DEMOLITION:

REVISE FOLLOWING TO SUIT PROJECT.

- A. **Perform selective demolition work** in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.
- B. **Demolish concrete and masonry in small sections.** Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.
- C. **Locate demolition equipment** throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors or framing.
- D. **Provide services** for effective air and water pollution controls as required by local authorities having jurisdiction.
- E. **Demolish foundation walls to a depth** of not less than 12 inches (300 mm) below existing ground surface. Demolish and remove below-grade wood or metal construction. Break up below-grade concrete slabs.
- F. **For interior slabs on grade,** use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible.

DELETE BELOW IF NO BELOW-GRADE DEMOLITION.

- G. **Completely fill below-grade areas** and voids resulting from demolition work. Provide fill consisting of approved earth, gravel or sand, free of trash and debris, stones over 6 inch (150 mm) diameter, roots or other organic matter.

- H. **If unanticipated mechanical**, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Designer in written, accurate detail. Pending receipt of directive from Designer rearrange selective demolition schedule as necessary to continue overall job progress without delay.
- I. **Asbestos contamination:** If a disturbance of ACM occurs remove any released material and decontaminate the immediate vicinity of the release in accordance with the requirements of Section 01712 Cleaning & Decontamination Procedures.

3.4 SALVAGE MATERIALS:

- A. **Salvage Items:** Where indicated on Drawings as "Salvage - Deliver to Owner," carefully remove indicated items, clean, store and turn over to Owner and obtain receipt.
 - 1. Historic artifacts, including cornerstones and their contents, commemorative plaques and tablets, antiques, and other articles of historic significance remain the property of the Owner. Notify Designer if such items are encountered and obtain acceptance regarding method of removal and salvage for Owner.
- B. **Carefully remove**, clean, and deliver to Owner the following items:

CLEARLY INDICATE LIST OF ITEMS (IF ANY) TO BE SALVAGED AND TURNED OVER TO OWNER IF NOT SPECIFICALLY SHOWN ON DRAWINGS. **BELOW ARE ONLY EXAMPLES, EDIT/ADD COMPONENTS TO SUIT PROJECT NEEDS.**

1. *Light Fixtures*
2. *Demountable partitions*
3. *Office landscaping*
4. *Wood paneling in Boardroom*
5. *Chandelier in entrance lobby*
6. *Statue in courtyard fountain*
7. *Commemorative plaque at main entrance*
8. *Five (5) lions head sculptures from East wing cornice frieze*

3.5 HAZARDOUS WASTE MANAGEMENT AND DISPOSAL.

IF THE WORK INVOLVES THE DEMOLITION AND DISPOSAL OF HAZARDOUS WASTE, INCLUDE THIS ARTICLE AND SECTION 02086 HAZARDOUS WASTE MANAGEMENT.

- A. **Manage and dispose of hazardous waste** such as PCB ballasts, fluorescent light tubes, and mercury thermostats in accordance with the requirements of Section 02086 - Hazardous Waste Management.
- B. **Do not mix potentially hazardous waste streams.** Where feasible, separate each type of hazardous waste from other types of hazardous wastes, from asbestos waste and from construction waste.
- C. **Segregate, package, label, transport and dispose** of Hazardous Waste in accordance with DOT, EPA, State and Local regulations.

DELETE BELOW IF NOT REQUIRED. IF FOUNDATION OR BELOW-GRADE DEMOLITION WORK REQUIRED, POSSIBLY INSERT MORE EXTENSIVE TEXT FROM MASTERSPEC NARROW SCOPE VERSION SECTION, DEMOLITION.

3.6 DISPOSAL OF DEMOLISHED MATERIALS:

- A. **Remove debris, rubbish** and other materials resulting from demolition operations from building site. Transport and legally dispose of materials off site.
- B. **If hazardous non-asbestos containing materials** are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.
- C. **Burning** of removed materials is not permitted on project site.
- D. **Disposal of asbestos-containing waste** is not in the work of this section. Disposal of this material is specified in Section 02084 Disposal of Regulated Asbestos Containing Material.

3.7 CLEAN-UP AND REPAIR:

- A. **Upon completion** of demolition work, remove tools, equipment and demolished materials from site.
- B. **In areas where no asbestos abatement work is to occur**, remove protections and leave interior areas broom clean.
- C. **In areas where asbestos abatement work is to occur**, leave protections in place as required by abatement work. Leave area broom clean. Additional cleaning as required for abatement work is not in work of this section.

- D. Repair** demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.
- E. Perform** all repair work in asbestos abatement Work Areas after completion of asbestos abatement work.

END OF SECTION 02062

SECTION 02063 - REMOVAL OF ASBESTOS CONTAMINATED MATERIALS

BEFORE EDITING THIS SECTION CHECK WITH LOCAL REQUIREMENTS FOR DEALING WITH CONTAMINATED MATERIALS. IN SOME LOCALITIES THIS MATERIAL MUST BE HANDLED AS ASBESTOS-CONTAINING.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract**, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

1.2 SUMMARY OF WORK:

- A. Work of this section includes** removal and disposal of all non-Asbestos-Containing Material including but not limited to:
 - 1.** Ceiling system and supports
 - 2.** Removal of all carpeting from within the work area

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Unlabeled Clear Bags:** Provide clear 6 mil (0.15 mm) thick leak-tight polyethylene bags with no label.
- B. Disposal Bags:** Provide disposal bags as described in Section 02084 "Disposal of Regulated Asbestos-Containing Material"

PART 3 - EXECUTION

3.1 SEQUENCE

A. Before beginning work of this section comply with:

1. 01503 Temporary Facilities - Asbestos Abatement
2. 01513 Temporary Pressure Differential and Air Circulation System
3. 01563 Decontamination Units
4. 01526 Temporary Enclosures
5. 01560 Worker Protection - Asbestos Abatement
6. 01562 Respiratory Protection

SELECT EITHER ABOVE OR BELOW. SELECT ABOVE FOR CLASS I AND II ASBESTOS WORK. SELECT BELOW FOR CLASS III AND CLASS IV ASBESTOS WORK.

7. Section 01527 - Regulated Areas

ADD THE SECTIONS BELOW FOR CLASS III ASBESTOS WORK

8. Section 01529 - Mini Enclosures and Glovebags
9. Section 01561 - Worker Protection - Repair & Maintenance
10. Section 01562 - Respiratory Protection

3.2 CEILING SYSTEM:

IT MAY BE LESS EXPENSIVE TO DISPOSE OF THESE MATERIALS AS ASBESTOS-CONTAINING WASTE RATHER THAN CLEAN THEM. INDIVIDUAL PROJECT CIRCUMSTANCES SHOULD BE CONSIDERED.

- A. Non-Asbestos Ceiling Tiles:** Remove sufficient ceiling tiles to gain access to top of ceiling system. Mist top of tiles with amended water. Wet sufficiently to soak debris thoroughly, but not cause dripping. Remove ceiling tiles and carry to Wash Down Station. Wash ceiling tiles in wash down station. Bag washed tiles in unlabeled clear 6 mil (0.15 mm) bags. Dispose of tiles as non-asbestos waste.
1. Bag debris from washed off tiles in properly labeled asbestos disposal bags. Dispose of debris as asbestos-containing waste as set forth in Section 02084 Disposal of Regulated Asbestos-Containing Material.

- B. **Support System:** Remove hangers, tracks, T-bars, etc. Decontaminate in Wash Down Station. Wrap in clear 6 mil (0.15 mm) sheet plastic. Dispose of as non-asbestos waste.

3.3 CARPETING:

THIS SECTION IS INTENDED TO SPECIFY THE REMOVAL OF CARPETING ONCE A DETERMINATION HAS BEEN MADE THAT IT IS CONTAMINATED.

IF THE CARPETING IS TO BE REMOVED AND DISPOSED OF AS A NON-CONTAMINATED MATERIAL, THEN DELETE THIS SECTION AND USE SECTION 02062 "NON-ASBESTOS DEMOLITION" TO SPECIFY THIS WORK. CARPETING SHOULD BE TESTED TO DETERMINE IF IT, OR THE DUST UNDERNEATH IT, IS CONTAMINATED BEFORE INCURRING THE EXPENSE OF THE FOLLOWING PROCEDURE. THE ONLY EFFECTIVE METHOD AVAILABLE FOR TESTING CARPET FOR ASBESTOS CONTAMINATION INVOLVES CUTTING OUT A PLUG AND SENDING IT TO A LABORATORY FOR SEM OR TEM ANALYSIS.

- A. **Deface carpeting** with a contrasting spray paint before the work. Coat lightly enough that wetting will not be retarded.
- B. **Thoroughly wet asbestos-contaminated carpeting** to be removed to reduce fiber dispersal into the air. Wet carpet prior to cutting, rolling or any other activity that could disturb dust in or under the carpet. Accomplish wetting by a fine spray (mist) of amended water or encapsulant. Saturate material completely without causing excess dripping. Allow time for water or encapsulant to penetrate material thoroughly. Spray material repeatedly during the work process to maintain a continuously wet condition. Spraying amended water or encapsulant on carpeting during cutting or rolling to minimize dispersal of asbestos fibers into the air.

SELECT ONE OF THE TWO PROCEDURES THAT FOLLOW AND DELETE THE OTHER. THE FIRST ALLOWS CARPETING TO BE SIMPLY ROLLED UP AFTER IT HAS BEEN SATURATED. THE SECOND REQUIRES THAT THE CARPETING BE CUT INTO SMALL PIECES AND PLACED IN DISPOSAL BAGS. DURING PROJECT DESIGN DETERMINE WHICH PROCEDURE IS MORE APPROPRIATE FOR PROJECT CONDITIONS.

USE THE FOLLOWING IF THE CARPET IS GOING TO BE SIMPLY ROLLED UP INTO LARGE ROLLS.

- C. **Cut seams in the carpeting and roll up** into rolls of carpeting that are no wider than factory width of carpeting. Roll or fold padding as necessary. Remove dust and debris from floor after removal of carpeting and padding by HEPA vacuuming followed by wet wiping.
 - 1. Wrap the rolled carpeting in two layers of 6 mil sheet plastic. Label and dispose of in accordance with requirements of specification section on "Disposal of Regulated Asbestos-Containing Waste."

SELECT EITHER ABOVE OR BELOW AND DELETE THE OTHER. USE ABOVE IF THE CONTROL OVER DUST RELEASE DURING CARPET REMOVAL IS DESIRED, BUT THE CARPET DOES NOT REQUIRE DISPOSAL AS ASBESTOS WASTE. USE BELOW IF THE CARPET REQUIRES DISPOSAL AS ASBESTOS-CONTAINING WASTE.

2. Dispose of rolled carpeting as normal construction debris.

USE THE FOLLOWING IF THE CARPET IS GOING TO BE CUT INTO SMALL PIECES AND PLACED IN ASBESTOS DISPOSAL BAGS.

- D. Cut carpeting into three foot wide strips.** Cut strips into short enough lengths to fit in asbestos disposal bags when rolled up. As carpeting and padding is removed, simultaneously pack material while still wet into disposal bags, 6 mil (0.15 mm) minimum thickness. Seal bags, clean outside and move to Wash Down Station adjacent to Material Decontamination Unit. Remove dust and debris from floor after removal of carpeting and padding by HEPA vacuuming followed by wet wiping.

3.4 AIRBORNE FIBER LEVELS:

- A. Airborne Fiber Levels:** Maintain airborne fiber levels less than the “Stop Action Levels” set forth in Section 01013 “Summary of Work - Asbestos Abatement.”

END OF SECTION - 02063

SECTION 02081 - REMOVAL OF ASBESTOS-CONTAINING MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and Division - 1 Specification Sections, apply to work of this section.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. **Worker Protection** requirements are set forth in Section 01560 Worker Protection - Asbestos abatement.
- B. **Installation of Critical and Primary Barriers**, and Work Area Isolation Procedures are set forth in Section 01526 Temporary Enclosures.
- C. **Project Decontamination** procedures after removal of the Secondary Barrier are specified in Section 01711 Project Decontamination.
- D. **Disposal of asbestos-containing waste** is specified in Section 02084 Disposal of Regulated Asbestos-Containing Material.
- E. **Section 02086 Hazardous Waste Management** describes the management and disposal of hazardous waste such as PCB Ballasts, fluorescent light tubes, and mercury containing thermostats encountered during the work of this section.

1.3 SUBMITTALS:

- A. **Before Start of Work:** Submit the following to the Designer for review. Do not start work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use.
 - 1. **Surfactant:** Submit product data, use instructions and recommendations from manufacturer of surfactant intended for use. Include data substantiating that material complies with requirements.
 - 2. **Removal Encapsulant:** Submit product data, use instructions and recommendations from manufacturer of removal encapsulant intended for use. Include data substantiating that material complies with requirements.

3. **NESHAP Certification:** Submit certification from manufacturer of surfactant or removal encapsulant that, to the extent required by this specification, the material, if used in accordance with manufacturer's instructions, will wet Asbestos-Containing Materials (ACM) to which it is applied as required by the National Emission Standard for Hazardous Pollutants (NESHAP) Asbestos Regulations (40 CFR 61, Subpart M).
- B. Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal has been' "Received - Not Reviewed."
1. **Material Safety Data Sheet:** Submit Material Safety Data Sheets, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for the following:
 - a. Surfactants.
 - b. Encapsulants.
 - c. Solvents.

PART 2 - PRODUCTS:

THE FOLLOWING ALLOWS THE CONTRACTOR TO USE EITHER A SURFACTANT IN WATER OR A REMOVAL ENCAPSULANT, PROVIDING THAT IT IS ABLE TO PERFORM AS WELL AS THE GENERIC MIXTURE OF ONE OUNCE OF A MIXTURE OF 50 PERCENT POLYOXYETHYLENE ESTER AND 50 PERCENT POLYOXYETHYLENE ETHER IN FIVE GALLONS OF WATER.
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2.1 MATERIALS

- A. **Wetting Materials:** For wetting prior to disturbance of ACM use either amended water or a removal encapsulant:
- B. **Amended Water:** Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the ACM and retardation of fiber release during disturbance of the material equal to or greater than that provided by the use of one ounce of a surfactant consisting of 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether mixed with five gallons (19 liters) of water.
- C. **Removal Encapsulant:** Provide a penetrating type encapsulant designed specifically for removal of ACM. Use a material which results in wetting of the ACM and retardation of fiber release during disturbance of the material equal to or greater than that provided by water amended with a surfactant consisting of one ounce of a mixture of 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether in five gallons (19 liters) of water.

THE SECONDARY BARRIER IS NOT REQUIRED FOR CLASS I JOBS WHERE (1) LESS THAN 10 SQ FT (3 SQUARE METERS) OR 25 LINEAL FT (7600 LINEAL MILLIMETERS) OF ACM OR PACM IS REMOVED; (2) A NEGATIVE EXPOSURE ASSESSMENT (NEA) IS MADE; AND (3) NO EMPLOYEES ARE WORKING IN ADJACENT AREAS. THE SECONDARY BARRIER IS NOT REQUIRED FOR CLASS II OR CLASS III JOBS.

THE SECONDARY BARRIER IS REQUIRED FOR CLASS I JOBS WHERE (1) MORE THAN 10 SQ FT (3 SQUARE METERS) OR 25 LINEAL FT (7.6 LINEAL METERS) OF ACM OR PACM IS REMOVED; (2) A NEA IS NOT PRODUCED; OR (3) EMPLOYEES ARE WORKING IN ADJACENT AREAS. THE SECONDARY BARRIER IS NOT REQUIRED FOR CLASS II OR CLASS III JOBS.

THE FOLLOWING IS MOST LIKELY TO BE FOUND ON THE JOB IN THE ABSENCE OF A MORE SPECIFIC REQUIREMENT.

- D. Polyethylene Sheet:** A single polyethylene film in the largest sheet size practicable to minimize seams, 6.0 mil (0.15 mm) thick clear, frosted, or black as indicated.

THE FOLLOWING IS A GOOD PRECAUTION IN AREAS WHERE THERE IS HOT EQUIPMENT OR A POTENTIAL FOR FIRE, SUCH AS IN A BOILER ROOM. FIRE RETARDANT SHEET PLASTIC IS CONSIDERABLY MORE EXPENSIVE THAN STANDARD PLASTIC.

- E. Polyethylene Sheet:** Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick frosted or black as indicated.
- F. Duct Tape:** Provide duct tape in 2 inch or 3 inch (50mm or 75 mm) widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
- G. Spray Cement:** Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.
- H. Disposal Bags:** Provide 6 mil (0.15 mm) thick leak-tight polyethylene bags labeled as required by Section 02084 Disposal of Regulated Asbestos Containing Material.
- I. Fiberboard Drums:** Provide heavy duty leak tight fiberboard drums with tight sealing locking metal tops.
- J. Paper board Boxes:** Provide heavy duty corrugated paper board boxes coated with plastic or wax to retard deterioration from moisture. Provide in sizes that will easily fit in disposal bags.
- K. Felt:** Standard felt approximately 1/16 inch (1.6 mm) thick and 36 inches (900 mm) to 72 inches (1800 mm) in width.

PART 3 - EXECUTION

THE SECONDARY BARRIER IS NOT REQUIRED FOR CLASS I JOBS WHERE (1) LESS THAN 25 LINEAR OR 10 SQUARE FEET (7.6 LINEAR METERS OR 3 SQUARE METERS) OF ACM OR PACM IS REMOVED; (2) A NEGATIVE EXPOSURE ASSESSMENT (NEA) IS MADE; AND (3) NO EMPLOYEES ARE WORKING IN ADJACENT AREAS. THE SECONDARY BARRIER IS NOT REQUIRED FOR CLASS II OR CLASS III JOBS.

THE SECONDARY BARRIER IS REQUIRED FOR CLASS I JOBS WHERE (1) MORE THAN 25 LINEAR OR 10 SQUARE FEET (7600 LINEAR MILLIMETERS OR 3 SQUARE METERS) OF ACM OR PACM IS REMOVED; (2) A NEA IS NOT PRODUCED; OR (3) EMPLOYEES ARE WORKING IN ADJACENT AREAS. THE SECONDARY BARRIER IS NOT REQUIRED FOR CLASS II OR CLASS III JOBS.

3.1 SECONDARY BARRIER:

- A. **Secondary Barrier:** Over the Primary Barrier, install as a drop cloth a clear 6 mil (0.15 mm) sheet plastic in all areas where asbestos removal work is to be carried out. Completely cover floor with sheet plastic. Where the work is within 10 feet (3 m) of a wall extend the Secondary Barrier up wall to ceiling. Support sheet plastic on wall with duct tape, seal top of Secondary plastic to Primary Barrier with duct tape so that debris is unable to get behind it. Provide cross strips of duct tape at wall support as necessary to support sheet plastic and prevent its falling during removal operations.
1. **Install Secondary Barrier** at the beginning of each work shift. Install only sufficient plastic for work of that shift.
 2. **Remove Secondary Barrier** at end of each work shift or as work in an area is completed. Fold plastic toward center of sheet and pack in disposal bags. Keep material on sheet continuously wet until bagged.
 3. **Install Walkways** of black 6 mil (0.15 mm) plastic between active removal areas and decontamination units to protect Primary Layer from tracked material. Install walkways at the beginning of, and remove at the end of, each work shift.

3.2 WORKER PROTECTION:

- A. **Before beginning work** with any material for which a Material Safety Data Sheet has been submitted provide workers with the required protective equipment. Require that appropriate protective equipment be used at all times.

3.3 WET REMOVAL:

- A. **Thoroughly wet** to satisfaction of Designer ACM to be removed prior to stripping and/or tooling to reduce fiber dispersal into the air. Accomplish wetting by a fine spray (mist) of amended water or removal encapsulant. Saturate material sufficiently to wet to the substrate without causing excess dripping. Allow time for amended 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. Perforate outer covering of any installation which has been painted and/or jacketed in order to allow penetration of amended water or removal encapsulant, or use injection equipment to wet material under the covering. Where necessary, carefully strip away while simultaneously spraying amended water or removal encapsulant on the installation to minimize dispersal of asbestos fibers into the air.

SOME MATERIALS, PARTICULARLY THOSE CONTAINING AMOSITE ASBESTOS, DO NOT WET WELL WITH WATER AMENDED WITH THE GENERIC MIXTURE OF ONE OUNCE OF A MIXTURE OF 50 PERCENT POLYOXYETHYLENE ESTER AND 50 PERCENT POLYOXYETHYLENE ETHER IN FIVE GALLONS OF WATER. OTHER WETTING AGENTS AND REMOVAL ENCAPSULANTS SHOULD BE TESTED ON THE MATERIAL FOR ADSORPTION. THIS SECTION SHOULD THEN BE MODIFIED TO SPECIFY THE MATERIAL MOST APPROPRIATE TO THE PROJECT.

THE FOLLOWING ARE GOOD PRACTICES FOR CONTROLLING AIRBORNE FIBER LEVELS IF THE MATERIAL DOES NOT WET WELL BECAUSE IT IS COATED, THICK, OR CONTAINS AMOSITE.

1. **Mist work area continuously** with amended water whenever necessary to reduce airborne fiber levels.
2. **Remove saturated ACM** in small sections from all areas. Do not allow material to dry out. As it is removed, simultaneously pack material while still wet into disposal bags. Twist neck of bags, bend over and seal with minimum three wraps of duct tape. Clean outside and move to Wash Down Station adjacent to Material Decontamination Unit.

USE THE FOLLOWING IF THE MATERIAL REMOVED CONTAINS AMOSITE ASBESTOS. OTHERWISE DELETE.

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

IN THE PARAGRAPH BELOW REDUCE THE 20 FEET (6000 MILLIMETERS) TO 4 FEET (1200 MILLIMETERS) IF THE MATERIAL BEING REMOVED CONTAINS AMOSITE ASBESTOS.

THE FOLLOWING REFERS TO HIGH PRESSURE WASHERS. THESE DEVICES CAN BE EXTREMELY EFFECTIVE IN CLEANING BUT CAN ALSO CAUSE FLOODING, SPLATTERING, AND SPRAY THROUGH HOLES INTO ADJACENT AREAS. WORKER SKILL AND JUDGMENT IS NECESSARY TO ACHIEVE DESIRED RESULTS WITH THIS EQUIPMENT. USE EXTREME CAUTION IN SPECIFYING THIS TYPE OF EQUIPMENT.

- B. **Fireproofing or Architectural Finish on Scratch Coat:** Spray asbestos-containing fireproofing or architectural acoustic finish with a fine mist of amended water or removal encapsulant. Allow time for amended water or removal encapsulant to saturate materials to substrate. Do not oversaturate to cause excess dripping. Scrape materials from substrate. Remove materials in manageable quantities and control the descent to staging or floor below, if over 20 feet (6000 mm) use drop chute to contain material during descent. If using amended water, spray mist surface continuously during work process. If using removal encapsulant follow manufacturer's written instructions. Remove residue remaining on scratch coat after scraping using stiff nylon bristled hand brush. Use high pressure washer only with written authorization of Designer. If a removal

encapsulant is used remove residue completely before encapsulant dries. If substrate dries before complete removal of residue re-wet with amended water or removal encapsulant.

- C. Fireproofing or Architectural Finish on Wire Lath:** Spray asbestos-containing fireproofing or architectural acoustic finish with a fine mist of amended water or removal encapsulant. Allow time for amended water or removal encapsulant to saturate material completely. Do not oversaturate to cause excess dripping. If surface of material has been painted or otherwise coated cut small holes as required and apply amended water or removal encapsulant from above. Cut wire lath into manageable sections and cut hanger wires. Roll or fold up complete with ACM and hand place in container. Do not drop on floor. After removal of lath and ACM remove any overspray on decking and structure above using stiff nylon bristled brush. Use high pressure washer only with written authorization from Designer. Use one of the following methods for containing waste.
- 1. Deposit material in corrugated paper board box.** When box is full duct tape closed and place in disposal bag.
 - 2. Wrap material in felt** and place in fiberboard drum lined with two disposal bags. Use caution to insure that all edges of wire lath that could cut plastic are covered with felt.
 - 3. Place material directly in a steel drum.** Seal drums when full with leak tight seal. Drum is to be leak tight in any orientation.
- D. Pipe Insulation:** Spray with a mist of amended water or removal encapsulant. Allow amended water or removal encapsulant to saturate material to substrate. If a removal encapsulant is used, use in strict accordance with manufacturer's instructions. Cut bands holding preformed pipe insulation, slit jackets at seams, remove and hand-place in a disposal bag. Remove job-molded fitting insulation in chunks and hand place in a disposal bag. Do not drop to floor. Remove any residue on pipe or fitting with stiff bristle nylon hand brush. In locations where pipe fitting insulation is removed from pipe with straight runs insulated with fibrous glass or other non-asbestos-containing fibrous material, remove fibrous material 6" (150 mm) from the point where it contacts the asbestos-containing insulation.

DELETE THE FOLLOWING IF THERE IS TO BE NO DRY REMOVAL

3.4 DRY REMOVAL:

WET REMOVAL AS SPECIFIED HEREIN IS REQUIRED UNLESS DAMAGE TO EQUIPMENT RESULTING FROM THE WETTING WOULD BE UNAVOIDABLE. IN SUCH CASE, LOCAL EXHAUST VENTILATION IN PLACE OF WET REMOVAL MIGHT BE USED, **BUT ONLY** WITH THE WRITTEN APPROVAL OF THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY. THE DESIGNER SHOULD HAVE A COPY OF EPA APPROVAL IN HAND BEFORE WORK COMMENCES. IF LOCAL VENTILATION (SECTION 01513) IS TO BE USED IN ADDITION TO WET REMOVAL METHODS, EPA APPROVAL IS NOT REQUIRED).

- A. **Dry Removal:** of ACM is required in the following areas where wetting may create a hazard for workers or damage equipment or finishes.

THE FOLLOWING ARE EXAMPLES. EDIT AS REQUIRED BY PROJECT SPECIFICS.

1. *Electrical closet on each floor: this space contains the vertical electrical bus for the building. This bus operates at 480 volts and must be kept in operation at all times.*
2. *Transformer vault: This space contains four large transformers operating at 14,000 volts on the primary side. These transformers must be kept in operation at all times.*
3. *High pressure steam lines from the boiler header to Steam Turbine no. 2. These line are operating at 300 psi (2100 kPa) and 422 degrees Fahrenheit (217 degrees Celsius) and cannot be shut down.*
4. *North Data Processing Center: This space contains operating computer equipment that must be maintained in operation throughout the work.*
5. *Reading Room: The damask wall coverings in this room are approximately 250 years old and extremely fragile.*

- B. **Isolate dry removal area** from balance of Work Area by a Critical Barrier as described in Section 01526 Temporary Enclosures and a pressure differential between the dry removal area and Work Area as described in Section 01513 Pressure Differential System.

- C. **EPA Authorization:** Do not begin dry removal work until authorized in writing by the EPA NESHAP coordinator and the Designer.

- D. **OSHA Notification:** Do not begin dry removal work until notification to OSHA required by 29 CFR 1926.1101(g)(4)(6) is made.

THE HISTORY OF ASBESTOS ABATEMENT IN THIS COUNTRY INCLUDES THE COPPER PLATING OF AN ABATEMENT WORKER PERFORMING A WET REMOVAL NEAR AN ELECTRICAL BUS. THIS FATAL ACCIDENT COULD HAVE BEEN AVOIDED BY PROPER WORK PROCEDURES AND SPECIFIC WORKER SKILLS.

THE FOLLOWING IS GENERAL AND SHOULD BE REVISED WITH THE ADVICE OF A SAFETY PROFESSIONAL. THE QUALIFIED TRADES PERSON IN SOME JURISDICTIONS WILL BE A LICENSED ELECTRICIAN. IF THIS IS THE CASE REVISE THE FOLLOWING TO MAKE THE REQUIREMENT MORE SPECIFIC.

- E. Active Electrical Equipment:** Do not wet materials in the vicinity of active electrical equipment. Dry remove any ACM in the vicinity of active electrical equipment.
- 1. Restrict Access:** Maintain existing access restrictions to areas with active electrical equipment. Allow access to area only to qualified trades persons with prior experience in the installation and repair of involved equipment.
 - 2. Warning Signs:** Post warning signs at the entry point to active electrical equipment as required by OSHA or other applicable regulation.
 - 3. Personnel:** Work on active electrical equipment is to be performed by qualified trades persons with prior experience in the installation or repair of the involved equipment. Restrict access to electrical equipment.
 - 4. Electrical Isolation:** Cover exposed conductors with a minimum 1/8 inch (3 mm) thick neoprene blanket draped over the conductor and surrounding area.
 - 5. Protective Equipment:** Provide workers working on or in the vicinity of active electrical with appropriate protective equipment including insulating gloves, boots, and non-conductive tools.
 - 6. Work Procedures:** Perform removal work using "Localized Control of Material Release" and "Local Ventilation and Collection System" procedures described below.
- F. Hot Equipment:** Do not wet materials on hot piping or equipment. Dry remove any ACM on hot equipment.
- 1. Restrict Access:** Maintain any existing access restrictions to areas with hot equipment. Provide railing or other barriers to prevent accidental contact with hot equipment. Allow access to area only to qualified trades persons with prior experience with the type of equipment involved.
 - 2. Warning Signs:** Post warning signs at hot equipment as required by OSHA or other applicable regulation.
 - 3. Personnel:** Work on hot equipment is to be performed by qualified trades persons with prior experience with the type of equipment involved. Restrict access to electrical equipment.
 - 4. Re-insulation:** Re-insulate equipment immediately following visual inspection. Do not allow more than 8 linear feet (2400 mm) of piping to be exposed at any time.
 - 5. Protective Equipment:** Provide workers working on or in the vicinity of hot equipment with appropriate protective equipment including insulating gloves, boots, and coveralls

6. **Work Procedures:** Perform removal work using "Localized Control of Material Release" and "Local Ventilation and Collection System" procedures described below.

3.5 LOCALIZED CONTROL OF MATERIAL RELEASE:

ALWAYS USE THE FOLLOWING FOR DRY REMOVAL PROJECTS.

THE FOLLOWING ARE EXAMPLES OF EXTREMELY CAREFUL WORK PRACTICES WHICH WILL HELP TO KEEP FIBER LEVELS LOW ON A DRY REMOVAL OR AN AMOSITE JOB. REVISE AS REQUIRED BY JOB SPECIFICS.

- A. **Pipe Insulation:** HEPA vacuum surface of pipe insulation. Cut bands holding preformed pipe insulation, slit jackets at seams while holding HEPA vacuum under cut, remove and hand-place in a disposal bag. Remove job-molded fitting insulation in chunks, using nozzle of HEPA vacuum to collect debris generated, and hand-place in a disposal bag. Do not drop to floor. Remove any residue on pipe or fitting with wire brush. Brushing toward the nozzle of a HEPA vacuum. In locations where pipe fitting insulation is removed from pipe with straight runs insulated with fibrous glass or other non-asbestos-containing fibrous material, remove fibrous material 6 inches (150 mm) from the point where it contacts the asbestos-containing insulation. Use a two worker crew for work, with one worker removing material and one worker holding the nozzle of a HEPA vacuum in the location of disturbance.
- B. **Material sprayed on wire lath:** Hold the nozzle from an operating HEPA filtered vacuum cleaner in the immediate vicinity of and below the work while cutting the wire lath or otherwise disturbing the ACM. Use a two-worker crew for cutting, with one worker cutting and one worker holding the HEPA vacuum nozzle.

ALWAYS USE THE FOLLOWING FOR DRY REMOVAL PROJECTS. THE FOLLOWING SECTION IS USEFUL IN CONTROLLING AIRBORNE FIBER COUNTS DURING DRY REMOVALS OR AMOSITE REMOVALS AND MAY PREVENT CLAIMS ARISING FROM SLOW WORK PROGRESS DURING THIS WORK.

3.6 LOCAL VENTILATION AND COLLECTION SYSTEM:

- A. **Provide local ventilation and collection systems** as described below for each area where amosite or dry ACM is being removed or otherwise disturbed:
 1. **Provide HEPA filtered fan units in addition** to those required by section 01513, in the vicinity of the work. Arrange so that the units exhaust into the Work Area oriented in a direction away from the work. Extend a 12 inch (300 mm) diameter flexible non-collapsing duct from the intake end to a point no more than 4 feet (1200 mm) from any scraping or wire brushing activity.

2. **Locate intake** of duct so that air flow is horizontally and slightly downward into intake. Replace primary filters on HEPA filtered fan units at an interval of no greater than 30 minutes. Allow no more than one scraping or wire brushing activity per fan unit.

USE ABOVE AND DELETE BELOW IF THE WORK INVOLVES SCRAPING MATERIAL OFF A SCRATCH COAT OR OTHER OPERATION THAT IS GOING TO GENERATE A CONSIDERABLE AMOUNT OF DEBRIS. BELOW IS APPROPRIATE FOR REMOVAL OF PREMOLDED PIPE INSULATION OR CUTTING WIRE LATH FOR REMOVAL.

3. **Attach a job-built 4 feet X 4 feet** (1200 mm x 1200 mm) flared end piece on intake end of duct. Support end piece horizontally at a point 4 feet (1200 mm) below the work, so that airflow is downward into intake.

3.7 HAZARDOUS WASTE MANAGEMENT AND DISPOSAL.

IF THE WORK INVOLVES THE DEMOLITION AND DISPOSAL OF HAZARDOUS WASTE, INCLUDE THIS ARTICLE AND SECTION 02086 HAZARDOUS WASTE MANAGEMENT.

- A. **Manage and dispose of hazardous waste** such as PCB ballasts, fluorescent light tubes, and mercury thermostats in accordance with the requirements of Section 02086 - Hazardous Waste Management.
- B. **Do not mix potentially hazardous waste streams.** Where feasible, separate each type of hazardous waste from other types of hazardous wastes, from asbestos waste and from construction waste.
- C. **Segregate, package, label, transport and dispose** of Hazardous Waste in accordance with DOT, EPA, State and Local regulations.

END OF SECTION - 02081

SECTION 02082 - REMOVAL OF ASBESTOS-CONTAMINATED SOIL

THE PROCEDURES SET FORTH IN THIS SECTION ARE USEFUL IF A CONTAMINATED DIRT FLOOR IN A ROOM OR CRAWL SPACE IS ENCOUNTERED AS PART OF THE WORK. EDIT AS REQUIRED BY SPECIFIC PROJECT REQUIREMENTS.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. **Drawings and general** provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to work of this section.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. **Asbestos abatement project requirements** to be completed prior to start of the work of this section are set forth in the following sections:
 - 1. 01503 Temporary Facilities - Asbestos Abatement
 - 2. 01513 Temporary Pressure Differential & Air Circulation System
 - 3. 01526 Temporary Enclosures - Complete Work Except Delete Floor Plastic.
 - 4. 01560 Worker Protection - Asbestos abatement
 - 5. 01562 Respiratory Protection
 - 6. 01563 Decontamination Units

- B. **Asbestos abatement project requirements** to be completed at completion of the work of this section are set forth in the following sections:
 - 1. 01711 Project Decontamination

SPECIFY THESE PRODUCTS HERE IF THE SECTION BELOW IS NOT USED.

- C. **Amended water and removal encapsulant** are specified in Section 02081 Removal of Asbestos-Containing Materials.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 PROCEDURES

- A. Wet Soils:** After removal of the Secondary Barrier and floor layer of Primary Barrier, remove the top one inch (1")(25 mm) of soils which are damp or wet and place in disposal bags. Start removal at the point of work farthest from the entrance to the soil floor area and proceed toward the entrance. Do not permit traffic into the fresh soil surface. Arrange Pressure Differential System so that air flow is the starting point of work toward the entrance. After the entire first layer of soil is removed completely change coveralls and at the entrance to the soil removal area don clean boot covers. Remove the second one inch (1")(25 mm) of soil in the same manner as the first. Carry out the decontamination procedures set forth in the "Project Decontamination" section of this specification at this time. At the end of project decontamination remove the third one inch (1") (25 mm) of soil in the same manner as the previous two inches (2") (50 mm).
- B. Dry Soils:** Use the same procedure for dry soils, except saturate soil with amended water or a removal encapsulant as specified in other Division 2 sections of the specification. If a removal encapsulant is used, use in accordance with manufacturer's instructions. Saturate soil beyond the inch of soil currently being removed. If amended water is used keep the surface of the soil continuously wet throughout removal and decontamination.

DECISION ON WHETHER OR NOT TO ALLOW USE OF A REMOVAL ENCAPSULANT SHOULD BE MADE AFTER TESTING INVOLVED SOIL.

END OF SECTION - 02082

SECTION 02083 - DISTURBANCE OF ACM DURING O&M WORK

GENERAL COMMENTS

This section describes operations and maintenance work activities that disturb asbestos-containing materials. It is intended to be used with several other sections to write specifications for O&M work that is going to be hired out to an asbestos abatement contractor rather than being performed by facility maintenance staff. O&M programs are frequently structured so that work that can be accomplished while avoiding ACM is carried out by facility staff, and work that actually disturbs ACM is contracted out. NIBS publishes a manual on the design of asbestos O&M programs and work practices: *GUIDANCE MANUAL, Asbestos Operations & Maintenance Work Practices*. Refer to the NIBS O&M Manual, and the introduction for more discussion on the design of asbestos O&M programs.

Section 02083 is used to specify the work activities once a regulated area has been set up and the work area has been accessed. It needs to be used with the following sections to form a complete specification for the work.

01527 Regulated Areas: This section provides the language for specifying the set up of a regulated area, as required by OSHA, in the area in which operations and maintenance work is to take place.

01528 Entry Into Controlled Areas: Requirements for O&M activities such as entry into a space above a suspended ceiling where there is an asbestos-containing fireproofing are set forth in this section.

01560 Worker Protection - Repair and Maintenance: describes the training, equipment and procedures necessary to protect workers against asbestos contamination and other work place hazards during maintenance activities. Respiratory protection is covered in the following section.

01562 Respiratory Protection: Establishes procedures and equipment for adequate protection against inhalation of airborne asbestos fibers.

The following sections are also intended to be used in securing contractor services in support of an operations and maintenance program. The specifications of the contracted portion of a typical asbestos O&M program will probably include most or all of the following sections. These sections need to be combined with the administrative specification sections and the other parts of the contract. Refer to the introduction for more information on the administrative specification sections and the necessary parts necessary for a complete set of Contract Documents.

01046 Cutting and Patching - Asbestos-Containing Materials: This section describes procedures to be used if asbestos-containing materials must be cut and patched.

01529 Mini-enclosures and Glovebags: Control procedures for maintenance activities that involve the disturbance of small areas of asbestos-containing materials, but for which there is no negative exposure assessment, or that involve drilling, cutting, abrading, sanding, chipping, breaking or sawing of TSI or surfacing material are set forth in this section.

01712 Cleaning and Decontamination Procedures: Sets forth procedures to clean up asbestos debris and dust, and procedures to decontaminate objects and rooms.

02084 Disposal of Asbestos-Containing Waste Material: The requirements for the proper containing, transport and disposal of asbestos waste are set forth in this section.

Section 02085 Resilient Flooring Removal -

Resilient Floor Covering Manufacturers' Recommended Non-Aggressive Work

Practices: This section describes the work practices for intact removal of resilient flooring, and the requirements for a negative exposure assessment for this sort of work. This section is written to be a "stand-alone" performance based specification for resilient flooring removal. It could be used to bid this work separately from other O&M work. Revision would be required to

make this section work with the other O&M sections. However, the necessary work practices can be excerpted from "Part 3- Execution" of this section and inserted in Section 02083.

15254 Repair of Insulation and Lagging:

Describes repair of insulation on pipes and other equipment using procedures that involve primarily bridging encapsulants and fabric reinforcing.

OSHA CLASSES OF WORK

The O&M specification sections are set up to insure compliance with the OSHA asbestos construction regulation (29 CFR 1926.1101) as a basic consideration. It is useful to understand some of the OSHA requirements to understand how the NIBS Guide Specification O&M specification sections work. The OSHA construction standard establishes four categories or classes of asbestos work.

Class I asbestos work means activities involving the removal of thermal system insulation (TSI) and surfacing asbestos-containing material (ACM) or presumed asbestos-containing material (PACM). (In general this involves work on friable materials.)

Class II asbestos work means activities involving the removal of asbestos-containing material (ACM) that is not TSI or surfacing material. This includes, but is not limited to, the

removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics. (In general, this involves work on non-friable materials.)

Class III asbestos work means repair and maintenance operations where ACM, including TSI and surfacing ACM and PACM may be disturbed. (In general this is O&M work that generates no more than a single disposal bag of waste.)

Class IV asbestos work means maintenance and custodial activities during which employees contact, but do not disturb, ACM or PACM, and activities to clean up dust, waste, and debris resulting from Class I, II, and III activities. Workers should wear respirators if cleaning up a regulated area where respirators are required.

LEVELS OF O&M WORK

The NIBS Document *GUIDANCE MANUAL Asbestos Operations & Maintenance Work Practices* breaks the work practices required for an O&M program into three levels that are defined in

terms of the OSHA construction standard (29 CFR 1926.1101). These three work practice levels are defined as follows:

LEVEL A

Level A: is work that may contact ACM, but which will not disturb it. Level A is defined in terms of Class II and IV work in the construction standard (29 CFR 1926.1101), or “housekeeping” in the general industry standard (29 CFR 1910.1001). It is 1926.1101 Class IV work (except for cleanup work) with a negative exposure assessment which involves, maintenance and custodial activities during which employees contact ACM and PACM, but do not disturb it. It is also Class II work with a negative exposure assessment that involves removal or repair of resilient floor covering materials (refer to the evaluation sheet for Section 02085 “Resilient Floor Covering Manufacturers’ Recommended Work Practices,” for information on the requirements for a negative exposure assessment with resilient flooring). In addition, it encompasses certain housekeeping operations, such as cleaning, buffing or polishing of resilient flooring, governed by the general industry standard, 1910.1001, where either: (1) a determination has been made that these activities using the work practices that are in the NIBS Document *GUIDANCE MANUAL Asbestos Operations & Maintenance Work Practices* (which are based on those contained in the OSHA regulation) are not reasonably expected to result in exposures exceeding the PEL; (2) the employer has monitored after March 31 1992 for the TWA permissible exposure limit and/or excursion limit

and the monitoring satisfies the requirements of 1910.1001(d); or (3) the employer has relied on objective data. In addition, housekeeping operations performed incidental to construction work are governed by the construction standard, 29 CFR 1926.1101(l), and are also within Level A when a Negative Exposure Assessment (NEA) has been made in accordance with 1926.1101(f)(2). (Refer to the discussion on Negative Exposure Assessment later in this evaluation for more information). Note that clean up of asbestos-containing debris and waste is not Level A work. Refer to Level B for this type of clean up work.

Work practices: required for Level A are those set forth in paragraph (g) (10) of the OSHA asbestos construction standard for Class IV work, in paragraph (g)(8) for Class II work involving resilient floor covering materials, and in the OSHA general industry standard for non-construction-related housekeeping activities. Awareness training is required for workers. If ACM is contacted or being cleaned up then wet methods and HEPA vacuums are required. Paragraph (k) of the general industry standard has specific requirements for stripping of finishes and burnishing or dry buffing asbestos-containing flooring. Generally Level A will not be contracted out, but will be performed by building cleaning and maintenance staff. There are no Guide Specifications for Level A work.

LEVEL B

Level B: is work that may disturb ACM, but where the OSHA PEL is not exceeded and release of ACM, dust and debris is confined to the immediate location of the disturbance. In the construction standard, it is Class III work on TSI or Surfacing ACM with a negative exposure assessment, Class IV work activities to clean up waste and debris containing ACM and PACM, or Class IV work without a negative exposure

assessment. Class III asbestos work includes repair and maintenance operations, where ACM, including thermal system insulation and surfacing material, is likely to be disturbed. Operations where TSI or surfacing are worked on using “aggressive” methods, such as drilling, cutting, abrading, etc. are Level C work, as OSHA requires area isolation for these procedures whether or not a negative exposure assessment is made. In the

general industry standard, clean up of waste, debris and accompanying dust that are not from construction activities, and where the PEL is not exceeded is Level B work. If more than a small quantity of material (limited to the amount of material that will fit in a 60" X 60" disposal bag) is disturbed then the activity becomes Class I or II and exceeds the limitation of the O&M specification sections, and must be specified as asbestos abatement work.

Work practices: required for Level B are those set forth in paragraph (g) (9) of the OSHA construction standard for Class III work. These include O&M training, respirators (Note: If work is on non-TSI or non-surfacing material and there is a negative exposure assessment then a respirator is not required), engineering controls and work practices, wet methods, local exhaust ventilation. In the construction standard, asbestos-containing debris and waste from construction activities (including O&M) are to be promptly cleaned up and disposed of in leak-tight containers. The general industry standard covers clean up of non-construction waste, debris and accompanying dust. These must be cleaned up with wet methods and HEPA vacuums. The construction standard requires that in areas with accessible, friable TSI and surfacing material, waste or debris must be presumed to contain asbestos. There several Guide Specification Section that are specifically intended for specifying Level B O&M work these are:

- 01046 Cutting & Patching - Asbestos-Containing Materials
- 01527 Regulated Areas
- 01528 Entry Into Controlled Areas
- 01561 Worker Protection - Repair & Maintenance
- 01562 Respiratory Protection
- 01712 Cleaning & Decontamination Procedures
- 02083 Disturbance of ACM During O&M Work
- 02084 Disposal of Regulated Asbestos-Containing Material
- 15254 Repair of Insulation and Lagging

Air Levels: Airborne fiber levels generated during Level B work need to be less than 0.01 f/cc. This requirement is necessary to insure that the building is not contaminated by the O&M work.

Worker Protection: In general the NIBS Guide Specifications require that workers be provided with respiratory protection even when there is a negative exposure assessment. It is normal practice in the asbestos control industry to require protection for workers based on a permissible exposure limit equal to the EPA PCM clearance level of 0.01 f/cc. In this way asbestos workers are as well protected as those who occupy asbestos work areas after clearance. The NIBS Guide Specification also requires the use of disposable clothing and a dry-decontamination procedure followed by a wet-decontamination at the end of a shift.

LEVEL C

Level C: is work where ACM is disturbed and the PEL may be exceeded or ACM, dust, and/or debris may be scattered beyond the immediate location of the disturbance. It is Class III work described in the OSHA construction standard: paragraph (g)(9)(iii) where the disturbance involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of thermal system insulation or surfacing material; or (g)(9)(iv) where there is no negative exposure assessment or

where the PEL is exceeded.

Work practices: required for Level C are mini-enclosures, glovebags and other enclosure devices set forth in paragraph (g)(5) of the standard as well as work practices set forth in paragraph (g)(9) of the OSHA standard for Class III work. These include O&M training, respirators, engineering controls and work practices, wet methods, local exhaust ventilation.

Debris and waste are to be promptly cleaned up and disposed of in leak-tight containers. There are several Guide Specification Section that are specifically intended for specifying Level B O&M work these are:

- 01529 Mini Enclosures and Glovebags
- 01561 Worker Protection - Repair & Maintenance
- 01562 Respiratory Protection
- 02084 Disposal of Regulated Asbestos-Containing Material

In addition the following Level B sections are needed to set up the work area for Level C work.

- 01527 Regulated Areas
- 01528 Entry Into Controlled Areas

Air Levels: The airborne fiber levels inside the enclosures established for Level C work may exceed the OSHA PEL of 0.1 f/cc and the EPA PCM clearance level of 0.01 f/cc inside the enclosure, but these levels should not be exceeded outside of the enclosure. This means that despite the fact that a glovebag is a Level C device, the airborne fiber levels outside of the glovebag cannot be allowed to exceed Level B limits. Airborne fiber levels generated during Level C work need to be kept at or below the EPA phase contrast microscopy clearance level of 0.01 f/cc outside of the enclosures. This requirement is necessary to insure that the building is not contaminated by the O&M work.

RESILIENT FLOORING

Resilient flooring is treated differently by OSHA, and as such the level definitions for these materials differs from that of other ACM. There are two different types of Level A, and a Level B+ that replaces both Levels B and C.

Level A1: Level A1 is defined in terms of Class II work in the construction standard (29 CFR 1926.1101). It is Class II work with a negative exposure assessment that involves removal or repair of resilient floor covering materials (refer to the evaluations for the resilient flooring specification sections for

Worker Protection: Mini-enclosures protect the building environment, but may actually increase airborne fiber levels experienced by workers. In addition, workers in a mini-enclosure are working in a contaminated environment and as such must go through some sort of decontamination procedure to remove ACM debris and residue from their person and clothing. The Guide Specification requires disposable clothing and a dry-decontamination followed by a wet decontamination before respirators are removed. The glovebag reduces exposure for both the building and the workers. However, OSHA and the NIBS Guide Specifications require that workers be provided with respiratory protection for glovebag work even when there is a negative exposure assessment. It is normal practice in the asbestos control industry to require protection for workers based on a permissible exposure limit equal to the EPA PCM clearance level of 0.01 f/cc. In this way asbestos workers are as well protected as those who occupy asbestos work areas after clearance

A "disturbance" of ACM, as used in the level definitions, refers to any activity that disrupts the matrix of ACM or PACM, crumbles or pulverizes ACM or PACM, or generates visible debris or dust from ACM or PACM.

information on the requirements for a negative exposure assessment with resilient flooring).

Work practices: required for Level A1 are those set forth in paragraph (g) (8) of the OSHA asbestos construction standard for Class II work involving resilient floor covering materials and in the compliance directive (CPL 2-2.63 Appendix D pages 34-36 November 3, 1995). If more than a small quantity of material is disturbed during work covered by the construction standard, then the activity exceeds the limitation of O&M work and should be treated as a full scale project.

Level A2: Level A2 is defined in terms of “housekeeping” in the general industry standard (29 CFR 1910.1001) and in the construction standard (29 CFR 1926.1101). It encompasses routine housekeeping operations covered by the general industry standard, where a determination has been made that cleaning buffing or polishing activities using the work practices in this manual (which are based on those contained in the OSHA regulation) are not reasonably expected to result in exposures exceeding the PEL. Note: When these activities are performed in relation to a construction operation, the construction standard (1926.1101) applies, and a negative exposure assessment is necessary (refer to Appendix A).

Work practices: required for Level A2 are those set forth in the OSHA general industry standard for non-construction-related housekeeping activities. Awareness training must be provided annually, in a manner that is comprehensible to all employees. Paragraph (k) of the general industry standard has specific requirements for stripping of finishes and burnishing or dry buffing asbestos-containing flooring. Note: If these activities are performed as part of a construction project, the construction standard (1926.1101) would apply. Refer to Appendix A for more information.

Level B+: Level B+ is removal of resilient flooring materials that are not intact, or will become non-intact during removal, or where a negative exposure assessment cannot be made. (Note: Material in this condition is described as “RACM,” under the EPA/NESHAP regulations. Refer to Appendix A for more information on

NESHAP requirements.) These augmented Level B work practices can be used for work on resilient flooring where flooring materials become friable, if the OSHA PEL is not exceeded and release of ACM, dust and debris is confined to the immediate location of the disturbance. To comply with OSHA, Level B work practices used for this purpose require critical barriers, as well as the respiratory protection, air monitoring and other work practices normally associated with Level B work. If more than a small quantity of material is disturbed during the work, then the activity exceeds the limitation of O&M work and should be treated as a full scale project.

Work practices: required for Level B+ are the same as those required for Level B with the addition of critical barriers. OSHA requirements for Level B work are set forth in paragraph (g)(8) of the asbestos construction standard for Class II work involving resilient floor covering materials. These work practices include O&M training, respirators, engineering controls and work practices, wet methods, local exhaust ventilation, prompt clean-up of debris, and waste disposal in leak-tight containers. Level B+ adds critical barriers as required by paragraph (g)(7) of the standard.

The designer should determine the appropriate level, based on the O&M program objectives, the O&M program elements, and level of training needed for each level of work practices used in a facility.

SELECTING WORK PRACTICES

An O&M program will be safer for workers, easier and more practical to implement and more cost efficient if it is designed so that the majority of work can be performed without enclosures. For this to happen, each work practice needs to be

developed to the point that there is no airborne exposure to asbestos (as defined by OSHA). In terms of the OSHA construction standard this means that a Negative Exposure Assessment (NEA) must be made.

NEGATIVE EXPOSURE ASSESSMENT (NEA)

OSHA sets forth the criteria that must be met to

demonstrate that worker exposures will be below

the PEL in 29 CFR 1926.1101(f)(2)(iii). The following briefly outlines the highlights of that paragraph. The standard should be referred to when attempting to make a negative exposure assessment. A negative exposure assessment can be made based on exposure data that conforms to any one of three criteria:

Objective data: The data must demonstrate that a work practice applied to a particular product or material cannot, “release airborne fibers in concentrations exceeding the TWA and excursion limit under those conditions having the greatest potential for releasing asbestos.”

Historical Data: Data from exposure monitoring performed during prior asbestos jobs in the last 12 months (historic data) can be used as the basis for an NEA. This data must be from, “work operations conducted under workplace conditions ‘closely resembling’ the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the employer’s current operations, the operations were conducted by employees whose training and experience are no more extensive than that of employees performing the current job, and these data show that under the conditions prevailing and which will prevail in the current workplace these is a high degree of certainty that employee exposures will not exceed the TWA or excursion limit.”

Initial exposure monitoring: The results of initial exposure monitoring from the current job can be used as the basis for an NEA. The data

used for this purpose must be, “from breathing zone samples that are representative of the 8-hour TWA and 30-minute short-term exposures of each employee covering operations which are most likely during the performance of the entire asbestos job to result in exposures over the PELs.” The data must show that exposures are expected to be below the PEL and EL.

OSHA governs the employer of the workers performing the O&M work. This means that the Contractor must perform the negative exposure assessment for the work specified in the Level B specification sections. On one hand, it is important that the Contractor’s responsibility for worker protection not get confused or diluted by actions by the Owner or Designer. On the other, the Owner needs to be reassured that the Contractor is properly protecting workers, and in particular that a negative exposure assessment has been properly made.

The NIBS Guide Specifications are structured so that a negative exposure assessment is a contract requirement established by the Owner for purposes of insuring that the building is not contaminated by the O&M work. An additional requirement is made that area samples taken in the vicinity of the work not exceed 0.01 f/cc as measured by phase contrast microscopy (PCM). The Contractor is required to make a submission demonstrating that the exposure goals of the specifications can be met. This is accomplished by submitting data from prior asbestos projects. The submission on personal samples must meet the requirements of an OSHA negative exposure assessment.

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SECTION 02083 - DISTURBANCE OF ACM DURING O&M WORK

THIS SECTION IS INTENDED TO BE USED ALONG WITH OTHER NIBS MODEL GUIDE SPECIFICATION SECTIONS FOR SPECIFICATIONS FOR O&M WORK THAT IS CONTRACTED OUT TO AN ASBESTOS ABATEMENT CONTRACTOR. NIBS PUBLISHES A MANUAL ON THE DEVELOPMENT OF ASBESTOS O&M PROGRAMS, "GUIDANCE MANUAL, ASBESTOS OPERATIONS & MAINTENANCE WORK PRACTICES." REFER TO THAT MANUAL FOR MORE INFORMATION ON DESIGNING WORK PRACTICES FOR O&M PROGRAMS.

PART 1 - GENERAL**1.1 RELATED DOCUMENTS:**

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF THE WORK:

PROCEDURES SET OUT IN THIS AND ACCOMPANYING SECTIONS, 01528, 01529, 01561, 01712 AND 15254 SHOULD BE USED TO SPECIFY PROCEDURES NEEDED TO SUPPORT REPAIR OR MAINTENANCE OF EXISTING BUILDING COMPONENTS. UNDER NO CIRCUMSTANCES SHOULD THESE SECTIONS BE USED TO SPECIFY DEDICATED PURPOSE REMOVAL OF ASBESTOS-CONTAINING MATERIALS (ACM).

- A. **Work of this section** is repair or maintenance work that may disturb ACM, but where the OSHA PEL is not exceeded and release of ACM, dust and debris is confined to the immediate location of the disturbance. In the OSHA construction standard (29 CFR 1926.1101), it is Class III work on TSI or Surfacing ACM with a negative exposure assessment, Class IV work activities to clean up waste and debris containing ACM and PACM, or Class IV work without a negative exposure assessment. Class III asbestos work includes repair and maintenance operations, where ACM, including thermal system insulation and surfacing material, is likely to be disturbed. If the quantity of material disturbed exceeds the capacity of one 60 inch x 60 inch glovebag or waste bag or is more than 25 linear feet or 20 square feet, the activity is Class I or II and exceeds the limitation of the work practices in this section.

1.1 RELATED WORK SPECIFIED ELSEWHERE:

- A. **Worker Protection:** is specified in Section 01561 "Worker Protection - Repair and Maintenance".
- B. **Respiratory Protection:** is specified in Section 01562 "Respiratory Protection"
- C. **Clean up of waste,** debris and accompanying dust that are not from construction activities, and where the PEL is not exceeded is specified in Section 01712 "Cleaning and Decontamination Procedures."

- D. Aggressive Operations:** Work where TSI or surfacing are worked on using “aggressive” methods, such as drilling, cutting, abrading, etc. are specified in Section 01529 “Mini-Enclosures and Glovebags.”

1.2 SUBMITTALS:

- A. Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal is returned for unrestricted use.
- 1. Exposure Monitoring:** Before starting any work submit to the Designer data demonstrating that the following exposure goals will be met during the work of this contract.
 - a. Area Samples:** Submit data from previous asbestos jobs demonstrating that area samples collected in the area of the work will, to a high degree of certainty, not be expected to exceed 0.01 f/cc.
 - 1) Submit data from past asbestos jobs where workplace conditions, the type of O&M work, material, control methods, work practices, and environmental conditions closely resemble those that will exist during the Work.
 - 2) Submit exposure data from prior asbestos jobs where the work was conducted by workers whose training and experience are no more extensive than that of workers who will be performing the work of this contract.

THE WORK OF THIS SECTION DEPENDS UPON A NEGATIVE EXPOSURE ASSESSMENT (NEA) HAVING BEEN MADE FOR THE WORK PRACTICES SPECIFIED. THE CONTRACTOR MUST MAKE THIS NEA AND DOCUMENT THIS IN A SUBMISSION TO THE DESIGNER. REFER TO THE INTRODUCTION FOR INFORMATION ABOUT NEGATIVE EXPOSURE ASSESSMENTS.

- b. Negative Exposure Assessment (NEA):** Before starting any work submit to the Designer a Negative Exposure Assessment, as required by OSHA 29 CFR 1926.1101, certified by a Competent Person. If a Negative Exposure Assessment cannot be made, report the reasons and any corrective action that would result in a Negative Exposure Assessment. The certification must be signed and dated by a Competent Person and be based on an Initial Assessment of the work specified in this section.
- 2. Surfactant:** Submit product data, use instructions and recommendations from manufacturer of surfactant intended for use. Include data substantiating that material complies with requirements.
 - 3. Sheet Plastic:** For fire retardant plastic submit test reports on NFPA 701 test.
 - 4. HEPA Vacuums:** Submit product data
 - 5. Signs:** Submit samples of signs to be used.

6. **Warning Tape:** Submit samples.

B. Before Start of Work submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal has been 'Received - Not Reviewed.'

1. Material Safety Data Sheet: Submit Material Safety Data Sheets, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for the following:
 - a. Surfactants.
 - b. Encapsulants.

PART 2 - PRODUCTS

2.1 SHEET PLASTIC:

EDIT THE FOLLOWING LIST TO ELIMINATE THOSE TYPES OF PLASTIC NOT USED.

FOLLOWING IS MOST LIKELY TO BE FOUND ON THE JOB IN THE ABSENCE OF A MORE SPECIFIC REQUIREMENT.

A. Polyethylene Sheet: A single polyethylene film in the largest sheet size possible to minimize seams, 6.0 mil (0.15 mm) thick , clear, frosted, or black as indicated.

FOLLOWING IS A GOOD GENERAL PRECAUTION AND SHOULD ALWAYS BE USED IN AREAS WHERE THERE COULD BE EXITING DIFFICULTIES IN CASE OF EMERGENCY (WORK AREAS ABOVE OR BELOW GRADE OR INTERIOR SPACES WITH LIMITED EXITS) OR THERE IS HOT EQUIPMENT OR A POTENTIAL FOR FIRE, SUCH AS IN A BOILER ROOM. FIRE RETARDANT SHEET PLASTIC IS CONSIDERABLY MORE EXPENSIVE THAN STANDARD PLASTIC.

B. Polyethylene Sheet: Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick , frosted or black as indicated.

REINFORCED PLASTIC SHOULD BE USED IN EXTERIOR APPLICATIONS WHERE THE SHEET IS EXPECTED TO BE STRESSED BY WINDS OR IN ANY LOCATION WHERE HIGH SKIN STRENGTH IS REQUIRED. FOLLOWING IS AN EXAMPLE OF LANGUAGE WHICH CAN BE USED. EDIT TO SUIT PROJECT REQUIREMENTS.

C. Reinforced Polyethylene Sheet: Where plastic sheet constitutes the only barrier between the Work Area and the building exterior, provide translucent, nylon reinforced or woven polyethylene, laminated, flame resistant, polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick , frosted or black as indicated.

2.2 MISCELLANEOUS MATERIALS:

- A. **Duct Tape:** Provide duct tape in 2 inch or 3 inch (50 mm or 75 mm) widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
- B. **Spray Cement:** Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.
- C. **Amended Water:** Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the ACM and retardation of fiber release during disturbance of the material equal to or greater than that provided by water amended with a surfactant consisting of one ounce of a solution of 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether mixed with five gallons of water.
- D. **Encapsulants** are specified in Section 09805.
- E. **Garden Sprayer:** Provide a hand pump type pressure-can garden sprayer fabricated out of either metal or plastic, equipped with a metal wand at the end of a hose that can deliver a stream or spray of liquid under pressure.

PART 3 - EXECUTION

3.1 GENERAL:

- A. **Before Start of Work:** Complete the following before start of work of this section:
 - 1. 01527 Regulated Areas

3.2 WORKER PROTECTION:

- A. **Before beginning work** provide workers with the required protective equipment. Require that appropriate protective equipment be used at all times.
- B. **Complete requirements** of the following:
 - 1. 01562 Respiratory Protection
 - 2. 01561 Worker Protection - Repair and Maintenance
 - 3. 01527 Regulated Area

3.3 EXPOSURE GOALS:

- A. **This section describes airborne fiber limits established by the owner** to insure that the building remains uncontaminated during asbestos operations and maintenance work. The

following exposure levels are not to be exceeded during performance of the work under this contract:

1. **Personal Air Samples:** Perform work in a manner that maintains airborne fiber levels below the 0.1 f/cc and that results in a negative exposure assessment as defined by OSHA in 29 CFR 1926.1101.
 2. **Area Samples:** Perform work in a manner that maintains airborne fiber levels in the vicinity of the work below the 0.01 f/cc as measured by phase contrast microscopy (PCM) using the NIOSH 7400 or OSHA reference method. Samples may be collected at a rate of up to 10 liter per minute for this purpose.
- B. Should any of the above levels be exceeded** in sampling by either the Contractor, Owner, or Designer immediately cease asbestos abatement activities until the fault is corrected. Do not recommence work until authorized by the Designer.
- C. Air monitoring by Owner:** The Owner's may perform air monitoring to verify that work is being performed in a manner that meets the exposure goals set forth in this section.
- D. Air monitoring** required by OSHA is work of the Contractor and is not covered in this section.

3.4 REMOVE ACM DEBRIS:

THIS WORK PRACTICE IS AN EXAMPLE OF ONE FOUND IN THE NIBS PUBLICATION "GUIDANCE MANUAL ASBESTOS OPERATIONS & MAINTENANCE WORK PRACTICES." REFER TO THAT PUBLICATION FOR MORE INFORMATION ABOUT WORK PRACTICES FOR OPERATIONS AND MAINTENANCE WORK.

- A. General:** Use the following procedures to remove ACM debris to permit repair or maintenance work. Use of this procedure is limited to situations where the amount of waste generated is not greater in size than the OSHA limit on Class III work (operation will generate no more waste than will fit into one 60 inch by 60 inch glovebag or disposal bag).
- B. Drop Cloth:** Prepare work area with drop cloth in accordance with requirements of Section 01527 "Regulated Areas."
- C. Access:** If access above ceiling is required, obtain access using procedures of Section 01028 "Entry into Controlled Areas." Place tools, equipment and materials needed onto drop cloth.
- D. Pick up any bulk debris** from top of equipment and within reach on top of ceiling and place into disposal bags.
- E.. Remove dust and debris** from top equipment and ceiling with HEPA vacuum.

- F. **Thoroughly wet wipe** equipment and surfaces that will be contacted during repair or maintenance work with amended water to remove all residue of ACM.
- G. **HEPA vacuum** top side of ceiling within reach from access area.
- H. **O&M work:** Performed required repair or maintenance work on exposed substrate.
- I. **Complete work:** Perform clean-up, tear-down and worker decontamination work of Section 01527 “Regulated Areas,” to complete the work.

3.5 INSTALL WIRING IN PLENUM SPACE

THIS WORK PRACTICE IS AN EXAMPLE OF ONE FOUND IN THE NIBS PUBLICATION “GUIDANCE MANUAL ASBESTOS OPERATIONS & MAINTENANCE WORK PRACTICES.” REFER TO THAT PUBLICATION FOR MORE INFORMATION ABOUT WORK PRACTICES FOR OPERATIONS AND MAINTENANCE WORK.

- A. **General:** Installing new plenum rated computer or telephone cables that will lay on top of ceiling, where there is dust or debris from ACM surfacing treatment or other ACM material on top of the ceiling tiles or if the ACM surfacing material is close enough to the work that it could be disturbed.
- B. **Limits:** Use of this procedure is limited to situation where the amount of waste generated is not greater in size than the OSHA limit on Class III work (operation will generate no more waste than will fit into one 60 inch by 60 inch glovebag or disposal bag).
- C. **Drop Cloth:** Prepare work area with drop cloth in accordance with requirements of Section 01527 “Regulated Areas.”
 - 1. Install a continuous drop cloth under area where cabling is to be run. Secure continuous drop cloth in place to minimize slipping hazards.
 - 2. Install a second drop cloth at each ceiling opening on top of the continuous drop cloth. Secure drop cloths in place to minimize slipping hazards.
- D. **Access:** Obtain access to plenum above using procedures of Section 01028 “Entry into Controlled Areas.” Place tools, equipment and materials needed onto drop cloth.
- E. **HEPA vacuum** top side of ceiling within reach from access area.
- F. **Observe top of ceiling** in direction that cables are to be run. Determine conditions at the next location where access above the ceiling is required:
 - 1. If there is any ACM debris or dust on top of ceiling tiles use work procedures from Section 01528 “Entry Into Controlled Areas.”

- G. Locate the next ceiling access** so that all parts of the ceiling top between access locations can be cleaned.
- H. Remove any ACM debris** in the path to be followed by cables. If there is any ACM debris remove with a HEPA vacuum. Spray a lock-back encapsulant on ceiling tile tops wherever debris is removed.
- I. Open enough ceiling tiles** that the cables can be passed by hand from opening to opening.
- J. Install cable(s)** by passing leading end of cable(s) from opening to opening. **DO NOT TOSS CABLES OR ANY OTHER OBJECT ABOVE THE CEILING.**
- K. Run cables** passing the cable from opening to opening as required without dragging cable across ceiling. Lift cables from floor into ceiling plenum. Do not drag cables from floor across ceiling grid up into ceiling plenum. Do not contact exposed ACM surfacing above ceiling. Minimize disturbance of ceiling system and other components above ceiling while running wiring.
- L. Complete work:** Perform clean-up, tear-down and worker decontamination work of Section 01527 "Regulated Areas," to complete the work.

3.6 REMOVE A SMALL AMOUNT OF ACM:

THIS WORK PRACTICE IS AN EXAMPLE OF ONE FOUND IN THE NIBS PUBLICATION "GUIDANCE MANUAL ASBESTOS OPERATIONS & MAINTENANCE WORK PRACTICES." REFER TO THAT PUBLICATION FOR MORE INFORMATION ABOUT WORK PRACTICES FOR OPERATIONS AND MAINTENANCE WORK.

- A. General:** Use the following procedures to remove a small amount of ACM as part of repair or maintenance operations. Use of this procedure is limited to situations where the amount of waste generated is not greater in size than the OSHA limit on Class III work (operation will generate no more waste than will fit into one 60 inch by 60 inch glovebag or disposal bag).
- B. Drop Cloth:** Prepare work area with drop cloth in accordance with requirements of Section 01527 "Regulated Areas."
- C. Access:** If access above ceiling is required, obtain access using procedures of Section 01028 "Entry into Controlled Areas." Place tools, equipment and materials needed onto drop cloth.
- D. Drop Sheet:** Install polyethylene drop sheet or a pan immediately below location of work to catch any falling debris.
- E. Wet:** Adequately wet area where hole is to be drilled. Wet sufficiently so that ACM is wetted completely. Allow amended water to soak into material so that ACM is wetted through to substrate in spot where ACM it to be removed.

1. If the surface is coated with paint, mist surface and scarify paint sufficiently for ACM to be wetted. Remove paint by peeling or scraping off as necessary. Wet surface of exposed ACM. Allow amended water to soak into material so that ACM is wetted through to substrate in spot where ACM it to be removed.

F. Remove ACM surfacing material using one of the following procedures.

1. Scrape away surfacing material to at least ½ inch (13 mm) beyond where hole is needed. Hold a pan immediately under area to catch debris while scraping. If any dry ACM is encountered stop scraping and wet ACM. Maintain scraping area and any dust or debris generated wet at all times.

THE FOLLOWING IS APPROPRIATE ONLY WHERE A HEPA VACUUM IS USED THAT CAN HANDLE WET WASTE (WET/DRY VACUUM) AND THAT HAS ENOUGH CAPACITY TO HOLD WASTE GENERATED DURING REMOVAL OPERATION. IN SOME O&M PROGRAMS, THE HEPA VACUUM IS USED AS THE PRIMARY STORAGE FACILITY FOR REMOVED ACM. SUCKING ACM DOWN A HEPA VACUUM HOSE HAS A TENDENCY TO LEAVE RESIDUE ON THE INSIDE OF THE HOSE. THIS IS ALRIGHT IF WORKERS ARE TRAINED TO SEAL THE HOSE BEFORE TURNING OFF THE VACUUM AS ROUTINE PROCEDURE. THERE SHOULD BE A PERIODIC WASHING OUT OF THE HOSE WITH AMENDED WATER. THIS CAN SERVE TO ADD EXTRA WATER TO THE COLLECTED WASTE AT THE TIME THE HEPA VACUUM IS EMPTIED.

2. Scrape away surfacing material to at least ½ inch (13 mm) beyond where hole is needed. Scrape material directly into the nozzle of an operating HEPA vacuum or use nozzle of HEPA vacuum directly as tool to remove ACM. Continuously maintain HEPA vacuum nozzle within 6 inches (150 mm) of where work is occurring. If any dry ACM is encountered stop scraping and wet ACM. Maintain scraping area and any dust or debris generated wet at all times.

G. Remove residue: After acoustical plaster is removed wet surface of substrate and remove all residue with a stiff nylon brush. Remove water and residue from surface with paper towels. Immediately dispose of towels in an asbestos waste bag. Repeat brushing and paper towel process three (3) times. If substrate is a scratch coat, wet substrate and scrape off 1/16 inch of scratch coat to remove any residual ACM that may be trapped in the texture of the scratchcoat.

DELETE THE FOLLOWING IF THE WORK IS ON FIREPROOFING. APPLYING AN ENCAPSULANT TO FIREPROOFING MAY NULLIFY ITS FIRE PROTECTION RATING.

- H. Spray substrate** and edges of acoustical plaster with clear penetrating encapsulant.
- I. O&M work:** Performed required repair or maintenance work on exposed substrate.
- J. Complete work:** Perform clean-up, tear-down and worker decontamination work of Section 01527 “Regulated Areas,” to complete the work.

3.7 DRILL ACM WITH A HEPA EQUIPPED DRILL:

THIS WORK PRACTICE IS AN EXAMPLE OF ONE FOUND IN THE NIBS PUBLICATION "GUIDANCE MANUAL ASBESTOS OPERATIONS & MAINTENANCE WORK PRACTICES." REFER TO THAT PUBLICATION FOR MORE INFORMATION ABOUT WORK PRACTICES FOR OPERATIONS AND MAINTENANCE WORK.

THIS WORK PRACTICE IS BASED ON THE USE OF TOOLS EQUIPPED WITH LOCAL EXHAUST VENTILATION USING A HEPA VACUUM. IN GENERAL THIS EQUIPMENT CONTAINS THE SITE OF THE DRILLING, SAWING ETC, IN A COLLAR OR SOME OTHER SORT OF ENCLOSURE. OSHA REQUIRES THAT DURING CLASS III (O&M) OPERATIONS THAT INVOLVE, "DRILLING, CUTTING, ABRADING, SANDING, CHIPPING, BREAKING, OR SAWING OF THERMAL SYSTEM INSULATION OR SURFACING MATERIALS, THE EMPLOYER SHALL USE IMPERMEABLE DROPCLOTHS, AND SHALL ISOLATE THE OPERATION USING MINI-ENCLOSURES OR GLOVE BAG SYSTEMS ...OR ANOTHER ISOLATION METHOD." THE REGULATION DOES NOT SET ANY STANDARD FOR HOW "ANOTHER ISOLATION METHOD" IS TO BE EVALUATED OR BY WHOM. FOR CLASS I WORK THE REGULATION REQUIRES THAT A COMPETENT PERSON EVALUATE ANY "ALTERNATE CONTROL METHOD," USED ON LESS THAN 25 LINEAR OR 10 SQUARE FEET OF TSI OR SURFACING MATERIAL. TREATING "ANOTHER ISOLATION METHOD" IN CLASS III WORK IN THE SAME MANNER SHOULD BE A CONSERVATIVE APPROACH THAT WOULD GUARD THE OWNER'S INTERESTS. THE DESIGNER NEEDS TO BE QUALIFIED AS A COMPETENT PERSON, AND NEEDS TO MAKE A DETERMINATION ABOUT WHETHER THE EQUIPMENT TO BE USED MEETS THE REQUIREMENTS FOR AN ALTERNATE CONTROL METHOD. IT IS POSSIBLE THAT AFTER THERE HAS BEEN SOME EXPERIENCE WITH THE OSHA REGULATION THE MANUFACTURERS OF THE TYPE OF EQUIPMENT USED IN THIS WORK PRACTICE WILL MAKE THE PROPER EVALUATIONS AND SUBMISSIONS TO OSHA AND PROVIDE A COPY OF THIS TO THE O&M PROGRAM DESIGNER.

- A. **General:** Use the following procedures to remove a small amount of ACM as part of repair or maintenance operations. Use of this procedure is limited to situations where the amount of waste generated is not greater in size than the OSHA limit on Class III work (operation will generate no more waste than will fit into one 60 inch by 60 inch glovebag or disposal bag).
- B. **Drop Cloth:** Prepare work area with drop cloth in accordance with requirements of Section 01527 "Regulated Areas."
- C. **Access:** If access above ceiling is required, obtain access using procedures of Section 01028 "Entry into Controlled Areas." Place tools, equipment and materials needed onto drop cloth.
- D. **Drop Sheet:** Install polyethylene drop sheet or a pan immediately below location of work to catch any falling debris.
- E. **Wet:** Adequately wet area where hole is to be drilled. Wet sufficiently so that ACM is wetted completely. Allow amended water to soak into material so that ACM is wetted through to substrate in spot where ACM it to be removed.
 - 1. If the surface is coated with paint, mist surface and scarify paint sufficiently for ACM to be wetted. Remove paint by peeling or scraping off as necessary. Wet surface of exposed ACM. Allow amended water to soak into material so that ACM is wetted through to substrate in spot where ACM it to be removed.
- F. **Drill holes** through ACM with drill equipped with dust collection collar attached to a HEPA vacuum. Follow manufacturer's instruction for use of equipment. Perform work in a manner that will keep the collar against the surface and the maintain the HEPA vacuum in operation during entire process of drilling hole.

1. If hole is being drilled through a surface, such as a suspended ceiling, where back side is inaccessible, at completion of drilling place HEPA vacuum hose near or through hole and run for several minutes to collect any airborne dust on backside of surface.
2. If hole is drilled from top side of deck: Wet ACM on underside of deck with amended water. Hold pan with sheet plastic drop cloth against surface of underside of deck to catch any falling debris, including material from hole. Drill hole through surface. Wet any debris in pan or on drop cloth on underside, package up debris and drop cloth/enclosure and dispose of as ACM.

G. HEPA vacuum hole and surfaces in vicinity of hole.

H. Wash and wipe out drill enclosure to remove all dust and residue from ACM.

DELETE THE FOLLOWING IF THE WORK IS ON FIREPROOFING. APPLYING AN ENCAPSULANT TO FIREPROOFING MAY NULLIFY ITS FIRE PROTECTION RATING.
--

I. Spray substrate and edges of acoustical plaster with clear penetrating encapsulant.

J. O&M work: Performed required repair or maintenance work.

K. Complete work: Perform clean-up, tear-down and worker decontamination work of Section 01527 "Regulated Areas" to complete the work.

END OF SECTION - 02083

SECTION 02084 - DISPOSAL OF REGULATED ASBESTOS-CONTAINING MATERIAL

THIS SECTION IS REQUIRED ONLY WHERE THERE WILL BE REMOVAL AND DISPOSAL OF REGULATED ASBESTOS-CONTAINING MATERIALS.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. **Worker protection requirements** are set forth in Sections 01560 Worker Protection - Asbestos abatement
- B. **Section 01098 Codes, Regulations and Standards - Asbestos Abatement** describes applicable federal, state and local regulations.

1.3 DESCRIPTION OF THE WORK:

- A. **This section describes the disposal of Regulated Asbestos-Containing Materials (RACM).** Disposal includes packaging of Regulated Asbestos-Containing Materials. Disposal may be accomplished either by land filling or converting Regulated Asbestos Containing Materials to non Asbestos waste.

THE DISPOSAL OF ASBESTOS CONTAINING MATERIALS THAT ARE DO NOT MEET THE NESHAP DEFINITION OF REGULATED ASBESTOS-CONTAINING MATERIAL (RACM) IS NOT COVERED UNDER NESHAP REGULATIONS. THESE MATERIALS MAY BE REGULATED UNDER STATE AND LOCAL REGULATIONS. THIS SECTION SHOULD BE MODIFIED TO REFLECT THE STATE AND LOCAL REQUIREMENTS

1.4 SUBMITTALS:

- A. **Before Start of Work:** Submit the following to the Designer for review. Do not start work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use.
 - 1. **Copy of state or local license** for waste hauler.

2. **Name and address of landfill** where Regulated Asbestos Containing Materials are to be buried. Include contact person and telephone number.

USE PARAGRAPH ABOVE IF WASTE IS TO BE BURIED OR PARAGRAPH BELOW IF WASTE IS TO BE CONVERTED TO A NON- ASBESTOS MATERIAL.
--

3. **Name and address of processor** where Regulated Asbestos-Containing Materials are to be processed into non-asbestos waste. Include contact person and telephone number. Also provide the following information about the process and operation used by the processor:
 - a. Results of start-up performance testing and performance testing for last 90 days including operating parameters, feed characteristics, and analysis of output materials.
 - b. Results of composite analysis required during initial 90 days of operation and results of composite analysis of monthly product composite samples for last 90 days.
 - c. Results of continuous monitoring and logs of process operating parameters for the initial 90 days and last 90 days of operation.
 - d. A description of any deviation from the operating parameters established during performance testing, the duration of the deviation, and steps taken to correct the deviation.
 - e. Product data on process to be used
 4. **Chain of Custody form** and form of waste manifest proposed
 5. **Sample of disposal bag** and any added labels to be used.
- B. On a weekly basis** submit copies of all manifests and disposal site receipts to Designer.
- C. Waste Shipment Record:** Maintain a waste shipment record as required by the NESHAP regulation which indicates the waste generator, transporter, and disposal site, and which describes the nature, size, type of container, and form of asbestos waste. Submit to Designer within 35 days of departure from building.

PART 2 - PRODUCTS:

2.1 MATERIALS

- A. **Disposal Bags:** Provide 6 mil (0.15 mm) thick leak-tight polyethylene bags labeled with three labels with text as follows:

THE FIRST SIGN BELOW IS REQUIRED BY OSHA 29 CFR 1926. THE SECOND SIGN IS REQUIRED BY THE U.S. DEPARTMENT OF TRANSPORTATION HAZARDOUS WASTE HAULING REGULATION. THE THIRD SIGN IS THE EPA NESHAP SIGN.

- 1. **First Label:** Provide in accordance with 29 CFR 1910.1200(f) of OSHA's Hazard Communication standard:

DANGER
 CONTAINS ASBESTOS FIBERS
 AVOID CREATING DUST
 CANCER AND LUNG DISEASE HAZARD
 BREATHING AIRBORNE FIBERS IS
 HAZARDOUS TO YOUR HEALTH

- 2. **Second Label:** Provide in accordance with U. S. Department of Transportation regulation on hazardous waste marking. 49 CFR parts 171 and 172. Hazardous Substances

RQ-ASBESTOS WASTE
 CLASS 9
 NA2212-PG III

- 3. **Third Label:** Provide the name of the waste generator (Owner's name), the location from which the waste was generated and the names and addresses of the contractor and transporter. This label must be durable, able to repel dirt and moisture (e.g., permanent marker). Label must be placed directly on disposal bag(s) in a legible format. **Peel and stick type labels are expressly prohibited.**

2.2 VITRIFICATION:

- A. **Convert Regulated Asbestos-Containing Materials to non-asbestos waste** by thermal conversion in a process including the following principal elements. Comply with all EPA and DOT requirements for asbestos waste until the waste is converted:

- 1. **Receiving and storage:** areas that are maintained as contained controlled areas isolated by physical barriers and a pressure differential

- 2. **Melting:** process that is intrinsically safe in that it will not allow unconverted asbestos to appear in the final product under any circumstances

- B. **Processor:** Use a processor that meets all the requirements of the EPA NESHAP regulation for an operation that converts regulated asbestos-containing material and asbestos-containing waste material into non-asbestos (asbestos-free) material as set forth in 40 CFR 61 Sub-part A and M section 61.155

- C. **Available Processors:** Subject to compliance with requirements, providers of processes include, but are not limited to, the following:

RETAIN ABOVE FOR NON-PROPRIETARY OR BELOW FOR SEMI-PROPRIETARY SPECIFICATION. REFER TO SECTION 01632 PRODUCT SUBSTITUTIONS - ASBESTOS ABATEMENT.

- D. **Processors:** Subject to compliance with requirements, utilize process provided by one of the Following:

THE FOLLOWING IS A LIST OF FIRMS BELIEVED TO PROVIDE THIS PROCESS. NO PROCESSORS HAVE BEEN INTENTIONALLY EXCLUDED AND NO ATTEMPT HAS BEEN MADE TO EVALUATE THE SAFETY, EFFECTIVENESS OR OTHER QUALITIES OF THESE PROCESSES. ADDITIONAL PROCESSORS MAY EXIST. PRODUCT LITERATURE SHOULD BE USED TO EVALUATE THESE PROCESSES AND TO VERIFY THAT LISTED PROCESSES COMPLY WITH THE SPECIFICATIONS AND MEET PROJECT REQUIREMENTS. IT SHOULD BE RECOGNIZED THAT THIS IS AN EMERGING TECHNOLOGY. VERIFY THAT PROCESSES INDICATED ARE AVAILABLE. EDIT OR ADD TO THE LIST AS APPROPRIATE TO THE PROJECT REQUIREMENTS. THE CURRENT STATUS ON THE COMMERCIAL AVAILABILITY OF THIS TECHNOLOGY CAN BE ASCERTAINED BY CONTACTING CATHOLIC UNIVERSITY OF AMERICA, IN WASHINGTON, DC, PHYSICS DEPARTMENT, VITREOUS STATE LABORATORY.

- 1. GTS Duratek
8955 Guilford Rd
Suite 200
Columbia, MD 21045
(800) 638-3838

- 2. Penberthy Electromelt
631 So. 96th Street
Seattle, WA 98108

PART 3 - EXECUTION

3.1 SEQUENCE

- A. **Comply with the following sections** during all phases of this work:
 - 1. **Section 01560** Worker Protection - Asbestos Abatement
 - 2. **Section 01562** Respiratory Protection

3.2 GENERAL:

- A. **All waste** is to be hauled by a waste hauler with all required licenses from all state and local authority with jurisdiction.
- B. **Liquid waste:** Mix all liquid asbestos-containing waste or asbestos contaminated waste with a bladeable material so that it forms a bladeable (non-liquid) form, and have the concurrence of the landfill operator prior to disposal.
- C. **Load all adequately wetted Regulated Asbestos-Containing Material** in disposal bags or leak-tight containers. All materials are to be contained in one of the following
 - 1. **Two 6 mil (0.15 mm) disposal bags** or

FIBERBOARD AND STEEL DRUMS ARE NOT ACCEPTED AT SOME LANDFILLS

- 2. **Two 6 mil (0.15 mm) disposal bags and a fiberboard drum** or
 - 3. **Sealed steel drum** with no bag
- D. **Protect interior of truck** or dumpster with Critical and Primary Barriers as described in Section 01526 Temporary Enclosures.
- E. **Carefully load containerized waste** in fully enclosed dumpsters, trucks or other appropriate vehicles for transport. Exercise care before and during transport, to insure that no unauthorized persons have access to the material.
- F. **Warning Signs:** During loading and unloading mark dumpsters, receptacles and vehicles with a sign complying with requirements of the EPA NESHAP regulation (40 CFR Part 61), in a manner and location that a person can read the following legend :

DANGER
ASBESTOS DUST HAZARD

CANCER AND LUNG DISEASE HAZARD
Authorized Personnel Only

- G. Do not store containerized materials outside of the Work Area.** Take containers from the Work Area directly to a sealed truck or dumpster.
- H. Do not transport disposal bagged materials on open trucks.** Label drums with same warning labels as bags. Uncontaminated drums may be reused. Treat drums that have been contaminated as Regulated Asbestos-Containing Material and dispose of in accordance with this specification.

NOTIFICATION REQUIREMENTS MAY VARY FROM LOCALITY TO LOCALITY. COORDINATE WITH SECTION 01098 CODES, REGULATIONS AND STANDARDS. FOLLOWING IS BASED ON REQUIREMENT IN AHERA REGULATION.

- I. Advise the landfill operator or processor, at least ten days in advance of transport, of the quantity of material to be delivered.**
- J. At disposal site unload containerized waste:**
 - 1. At a disposal site, sealed plastic bags may be carefully unloaded from the truck. If bags are broken or damaged, return to work site for rebagging. Clean entire truck and contents using procedures set forth in section 01711 Project Decontamination.**
 - 2. At a processing site truck and loading dock are arranged as a controlled work area and containerized waste is transferred to storage area by site personnel. All bags including broken ones will be transferred. Clean truck, using procedures set forth in section 01711 Project Decontamination.**
- K. Retain receipts from landfill or processor for materials disposed of.**
- L. At completion of hauling and disposal of each load submit copy of waste manifest, chain of custody form, and landfill receipt to Designer.**

END OF SECTION - 02084

SECTION 02085 - RESILIENT FLOORING REMOVAL - MANUFACTURERS' RECOMMENDED NON-AGGRESSIVE WORK PRACTICES

GENERAL COMMENTS

Section 02085 "Resilient Flooring Removal - Resilient Floor Covering Manufacturers' Recommended Non-Aggressive Work Practices" presents the work practices recommended for intact removal by resilient flooring manufacturers, which can be performed without many of the regulatory controls required for Section 02087 (Resilient Flooring Removal - Aggressive Asbestos Abatement).

The Resilient Floor Covering Institute (RFCI) and Armstrong World Industries (hereinafter referred to as the Resilient Floor Covering Manufacturers) have developed work practices that apply to the removal of asbestos and non-asbestos-containing resilient floor covering materials. Section 02085 "Resilient Floor Covering Removal Manufacturers' Recommended Non-aggressive Work Practices" is based on those work practices.

OSHA revised its asbestos standard in August of 1994. Resilient flooring manufacturers filed petitions for judicial review of parts of the standard. A settlement agreement resolving these petitions was reached with OSHA on June 15, 1995 before a court decision was rendered. This "Settlement Agreement" is included in Appendix D to the OSHA Compliance Directive that relates to the new OSHA standard (CPL 2-2.63, November 3, 1995, Inspection Procedures for Occupational Exposure to Asbestos Final Rule 29 CFR Parts 1910.1001, 1926.1101, and 1915.1001). The designer should acquire a copy of the OSHA Compliance Directive

from the local OSHA office and review it during the development of facility specific work procedures for resilient flooring.

The EPA NESHAP regulation (40 CFR Part 61, Subpart M) addresses the handling and disposal of asbestos-containing materials during renovation and demolition of buildings. The position of the EPA on resilient flooring was clarified in the November 1990 revision of the NESHAP regulation. Asbestos-containing resilient floor products are defined by this regulation as a Category I nonfriable material, which is not regulated by the NESHAP unless it becomes friable or is subjected to sanding, grinding, cutting or abrading. Cutting in this instance includes sawing, but not shearing, slicing or punching. The EPA has determined that resilient flooring materials that have not been made friable before or during the work do not need to be disposed of as asbestos waste.

Any work procedures used must, at a minimum, meet the requirements of the OSHA and NESHAP regulations. This introduction describes the steps necessary to insure that removal operations will be in compliance with these regulations. The designer should realize that state or local regulations may have requirements that differ from federal regulations and some may be more stringent. The work procedures in this section may have to be modified to comply with state or local regulations.

OSHA

During development of the OSHA regulation exposure data for workers involved in removal of resilient flooring was submitted. In the Settlement Agreement with the flooring manufacturers, OSHA agreed that data submitted during the rulemaking shows that removal of asbestos-containing resilient flooring material consistently results in worker exposures below the PEL (both the TWA and excursion limit), as long as certain work practices are followed. These work practices are referred to as “compliant work practices.” OSHA has determined that a data set called the “Environ Data” is an example of this type of exposure data, and that work practices recommended by the resilient floor covering manufacturers is an example of compliant work practices. This means that the Environ Data can be used as the basis for a “Negative Exposure Assessment” as long as the “Recommended Work Practices” are used, and the material remains “intact” throughout the removal process. If a negative exposure assessment is made OSHA does not require that the work area be enclosed or that workers wear respirators or other asbestos specific protective clothing. If the owner or designer wants to specify more stringent standards than OSHA requires then refer to information later in this Evaluations section on Optional Quality Control Measures. The work procedures in this section are based on the manufacturers’ “Recommended Work Practices.”

The designer and owner are not responsible for the contractor’s OSHA compliance. However, the designer should verify that conditions in a given building will allow the contractor to comply with OSHA by using the recommended work practices. There are several steps necessary to insure OSHA compliance when using these procedures:

- **A negative exposure assessment must be made by the competent person.** The OSHA asbestos rulemaking record contains many measurements, collected under a variety of worksite conditions, showing worker exposures during removals of asbestos-containing “flooring material” (floor tile, sheet vinyl floor covering and flooring adhesive). As part of the Settlement Agreement, OSHA has agreed that these data show that use of Compliant Work

Practices during removal of intact flooring material consistently result in worker exposures below the TWA and Excursion Limit established by the revised OSHA standard. Before removal begins, a Competent Person must assess the job and may make a negative exposure assessment based on data in the OSHA rulemaking record when all three of the following requirements are met:

1. Compliant (Recommended) Work Practices are used;
 2. Workers are properly trained; and
 3. The resilient flooring is intact and is likely to remain intact throughout the removal process.
- **Compliant (Recommended) Work Practices will be used.** The work practices in section 02085 are based on “Recommended Work Practices for the Removal of Resilient Floor Coverings,” revised August, 1995, published by the Resilient Floor Covering Institute (RFCI) and Armstrong World Industries, Inc. OSHA has agreed that these “Recommended Work Practices” are an example of compliant work practices. If these work practices need to be modified due to specific circumstances of a facility, caution should be used to insure that the changes do not change their status as examples recognized by OSHA.. If any change is going to be made to the work procedures, the O&M designer should refer to the original “Recommended Work Practices” and the OSHA Compliance Directive to insure that the new procedure is still a “Compliant Work Practice”
 - **Workers are properly trained.** Workers using the Recommended Work Practices for the removal of resilient floor covering materials must have completed an 8-hour training program as required by the OSHA regulation 29 CFR 1926.1101 and the compliance directive. The course must cover asbestos subjects as well as training in the Recommended Work Practices. A Competent Person involved in removal of intact flooring material using compliant work practices must have completed an 8-hour worker training program and additional 4 hours of training (a

total of 12 hours of training) as required by the Settlement Agreement.

- **The resilient flooring is intact and is likely to remain intact throughout the removal process.** Intact in this instance means that the ACM has not crumbled, been pulverized, or otherwise deteriorated so that it is no longer likely to be bound with its matrix. In the Settlement Agreement OSHA agreed that the incidental breakage of flooring material, including slicing of sheet vinyl floor covering with a sharp-edged instrument, during removal operations using “Compliant Work Practices” does not mean that the material is not removed in an “intact” condition. Rather, the issue of whether flooring material is “intact” is determined by whether the flooring material (whether broken or not) has crumbled, been pulverized, or has otherwise deteriorated so that it is not likely to be bound with its matrix.

A Negative Exposure Assessment is not justified if these three conditions are not met. If a negative exposure assessment is not or cannot be made, or if applicable OSHA exposure limits are exceeded, other provisions and requirements of the OSHA asbestos regulation remain in full force and effect.

If a job begins as an intact removal, but the material being removed becomes non-intact or no longer can be removed intact, work must be stopped until workers and a competent person with the appropriate training and engineering controls required for non-intact (or aggressive) removal methods, are put into place. OSHA reserved the right to reconsider its determination that a negative exposure assessment for particular floor removal operations may be based solely on the data in the rulemaking record if OSHA field data or other information, weighed against the data in the rulemaking record, show that exposures during particular floor removal operations in which compliant work practices are used are likely to exceed the TWA or Excursion Limit.

- **A “Competent Person” must supervise the work and have authority to take prompt corrective measures to eliminate hazards to the health and safety of workers.** This does

not mean that the Competent Person is required to be on-site at all times during the work, but in order to comply with the OSHA requirement of frequent and regular inspection of the job site, the competent person supervising a flooring removal project shall inspect the site prior to the start of removal operations (e.g. during the pre-job bidding process) for the purpose of conducting the initial exposure assessment. If a negative exposure assessment is made, the competent person must thereafter inspect the site within a reasonable time of an employee request or upon learning of any conditions that cast doubt on the validity of the negative exposure assessment, such as unusual difficulty in removing the material. For work on intact resilient flooring, the Competent Person must, as a minimum, have the 12 hours of training required by OSHA for a Competent Person involved in removal of intact flooring material using compliant work practices. If non-intact resilient flooring is involved, or if the flooring cannot be removed intact, then the competent person must have completed a 40 hour training course meeting the criteria of EPA’s Model Accreditation Plan for supervisors. The training required for intact resilient flooring removal differs from that required for competent persons for other asbestos abatement activities. Most other abatement activities require a minimum of 40 hours of training for a Competent Person, as opposed to the 12 hours required for intact resilient flooring work. The training required for resilient flooring work could be included in the longer course, but this needs to be verified by the designer.

- **Recommended Work practices must be used.** The designer must insure that the work procedures used in a facility are equivalent to the “Recommended Work Practices” published by the resilient flooring manufacturers. The work practices in Section 02085 are equivalent to the “Recommended Work Practices” which OSHA has accepted as an example of “Compliant Work Practices.” If these work practices need to be modified to suit conditions in a particular facility, the designer should make a determination about

whether the work practice is equivalent to the “Recommended Work Practices.” A negative exposure assessment will be necessary before using a work procedure that is changed enough that it is no longer equivalent.

- **Compliance with OSHA is a minimum requirement.** The designer can decide to specify worker and area protection that is more stringent than OSHA requires. If procedures more stringent than OSHA requirements are to be used, then the designer should consider the issues of worker protection separately from the issue of a negative exposure assessment and enclosure. The work can be based on work
- **Compliance with state and local regulations:** In addition to federal regulations, various other federal, state, and local government agencies have regulations governing the removal of in-place asbestos-containing material. Some state and local regulations differ from federal regulations and may be more stringent. It is recommended that the specifier determine whether such regulations apply.

procedures for which there is a negative exposure assessment, but respiratory protection and other worker protective measures such as protective clothing, hand and face washing or end of shift showering can still be specified.

CONSIDERATIONS REGARDING THE USE OF 02085

The use of Section 02085 is dependent upon a competent person making a Negative Exposure Assessment (NEA) as described above. The section functions as a performance specification that has a competent person employed by the contractor make the NEA. The designer should be familiar with the requirements for the NEA and with the OSHA Compliance Directive (2-2.63 November 3, 1995) that sets forth these requirements. The designer should be convinced that the NEA claimed by the contractor is realistic. However, if the designer makes the NEA, or participates in the making of it, then this could shift part of the responsibility for successful execution of the compliant work practices to the designer and owner.

Compliant work practices such as the Manufacturers’ Recommended Work Practices upon which Section 02085 is based, when followed, can provide an effective means to control occupational exposures below those limits set by OSHA. [The air monitoring performed for OSHA exposure monitoring does not distinguish between asbestos and non-asbestos fibers and cannot measure the short or thin fibers that may be detected using transmission electron microscopy (TEM) analysis. Air monitoring data for OSHA exposure may not be an accurate predictor of TEM results. Clearance

monitoring using TEM analysis is required by the federal government only under AHERA for applicable school projects involving ACM which is or becomes friable. Some TEM data indicate that workers may be exposed to short or thin fibers, which are not counted in air monitoring analysis under the OSHA standard, when attempting to follow the procedures contained in this section. If clearance monitoring requiring TEM analysis is specified, the results can be affected by short or thin fibers which may be generated when attempting to follow the procedures contained in this section and/or by nearby job operations involving ACM.]

Specifiers of resilient flooring removal should consider means to prevent influence of other asbestos related work on any clearance monitoring (especially using TEM analysis) which may be specified for the flooring removal. The reverse, i.e., preventing influence from the flooring removal project on the TEM clearances of other asbestos related work, should also be considered. Methods to consider include proper sequencing of the different removal projects, use of critical barriers and project decontamination procedures, and having the resilient flooring removal performed using section 02087, Resilient Flooring Removal - Asbestos Abatement. Refer to the section of this evaluation on “Optional

Quality Control Measures for additional discussion on this topic.

Use of compliant work practices such as the Manufacturers' Recommended Work Practices upon which Section 02085 is based, have been found by OSHA to consistently result in worker exposures below the TWA and Excursion Limit established by the revised OSHA standard. However, under certain circumstances such as sanding, drilling, sawing, or mechanical chipping the flooring material may be rendered (or already have been rendered) friable or not intact. In general, worker and area protection specifications of Section 02087, Resilient Flooring Removal - Aggressive Asbestos Abatement, should be used if flooring material has been found to be asbestos-containing and is or becomes friable or not intact, or if additional quality control measures are desired.

If asbestos-containing resilient floor covering material is found to be friable, or becomes friable during removal, it is regulated as asbestos-containing material under the NESHAP, and NESHAP notification, emission control,

transportation and waste disposal requirements may apply. Similarly, if floor covering in schools (grades K-12) is or becomes friable, removal performed as an abatement action is covered by EPA Asbestos Emergency Response Act (AHERA, 40 CFR 763.90(I)(v)) regulations, and design, contractor and abatement worker accreditation, and area clearance requirements apply for work greater than small-scale, short duration.

To obtain a complete copy of the work practices booklet and/or a copy of the Environ reports discussed above, contact:

Resilient Floor Covering Institute
966 Hungerford Drive, Suite 12-b
Rockville, Md 20850
(301)340-8580

Armstrong World Industries, Inc.
P.O. Box 3001
Lancaster, Pa 17604
(800) 438-5954

RESILIENT FLOORING REMOVAL EQUIPMENT

The following equipment has either been designed specifically for removal of resilient flooring, or has had long use for this purpose. Removal of resilient flooring is a three-part process: removal of the flooring, removal of heavy mastic or backing material, and surface cleaning of the slab.

Tile removal can be accomplished by use of scrapers, manual spades or infrared devices. After the flooring is removed any heavy coatings of built-up mastic, felt backing or rubber backing must be removed. This is accomplished by wet scraping. The final step involves cleaning all mastic residue from the slab. This is accomplished by use of a terrazzo machine.

- **Manual Spades:** Hand operated scraper/chisels with long handles and replaceable blades for removal of resilient flooring. Manual spades are

the routine hand tool for removing resilient flooring. These are hand-operated scraper/chisels. They are generally long-handled (up to 5 feet) and often weighted. All have replacement blades. The spade is forced under the flooring and, by exerting a forward pressure and twisting action, promotes the release of the flooring. The mastic must be removed in a second operation. These tools will remove whole tiles, but can break some of the resilient flooring into smaller pieces during removal. Use of this equipment is also included in Section 02087 "Resilient Flooring Removal - Aggressive Asbestos Abatement."

- **Infrared Equipment with Automatic Control:** Equipment utilizing controlled infrared radiant heat to make the resilient floor tiles and adhesive soft and pliable for removal. This

equipment is an alternative to mechanical removal using a spade. After tile removal the mastic must still be dealt with in the normal manner. This equipment generally utilizes controlled infrared radiant heat to make the tile soft and pliable for removal. The use of infrared heat equipment to remove floors began around 1990 and currently is in wide use as a method to non-aggressively remove resilient floor covering. Air monitoring studies have been conducted on jobs employing infrared heat removal equipment and some of this data has been submitted to OSHA in the Environ Reports and subsequently determined by OSHA as acceptable for use in establishing a "Negative Exposure Assessment" (NEA). The project designer should determine if state or local regulations add requirements for worker protection, enclosure, negative air containment or other requirements beyond OSHA. This should be evaluated by the project designer. The project designer should evaluate the equipment to determine if there are likely to be problems of fumes, vapors or fires. This may make some machines unsuitable for use on some substrates. It may be hazardous to use some machines in an enclosed environment such as an asbestos abatement project area. Other sections of the specification may have to be modified to

allow for greater ventilation, fire watches, fire-resistant enclosures, etc. Combination respiratory protection may be needed. Open-flame and propane-fueled devices should not be used. Use of this equipment is also included in Section 02087 "Resilient Flooring Removal - Aggressive Asbestos Abatement."

- **Terrazzo Grinders:** Machines with stones facing flat against the floor that are used wet to remove hard materials with a grinding action. Terrazzo is made by pouring concrete with colored aggregate and colored cement, and then grinding it to a smooth flat surface. The terrazzo grinder uses abrasive stones to grind away a sufficient amount of the aggregate and cement to produce the finished surface. These machines work well when used with wet sand to grind away the residue of adhesive left after resilient flooring removal. The process is a wet one so that airborne fiber levels are minimized. This is the tool recommended by the resilient flooring manufacturers for the removal of adhesive residue. Use of this equipment is also included in Section 02087 "Resilient Flooring Removal - Aggressive Asbestos Abatement."

USING SECTION 02085

Specification Section 02085 "Resilient Flooring Removal - Resilient Floor Covering Manufacturers' Recommended Work Practices" is intended for use either as a stand alone section for use in specifying flooring removal by a flooring contractor, or as part of a larger project.

Many resilient flooring removal projects are small, and are part of a flooring replacement in one or several rooms. In projects of this size, frequently there is a single payment to the Contractor at the completion of the work. In this instance, Section 02085 could be combined with a purchase order or other simple contract document. Section 02085 sets forth the specifications for executing the work. The

purchase order would need to set forth the scope of work, contract sum and payment schedule.

If the project is larger or has more extensive needs for scheduling or contract administration, then Section 02085 should be used with specification sections intended for normal construction such as those available from AIA MASTERSPEC or NIBS SPECTEXT. The administrative sections 01013 - "Summary of the Work - Asbestos Abatement," 01028 - "Application for Payment - Asbestos Abatement," and 01701 - "Contract Closeout - Asbestos Abatement" from these guide specification are appropriate for specifying work with Section 02085. However, other administrative and technical

sections in this guide specification contain specifications that are in conflict with 02085. In general, these sections should not be used. If they are to be used for some reason, they need substantial

revision. Refer to paragraph 7 of this section for more information on using specifications from these sections with Section 02085.

NESHAP

The NESHAP regulates the disposal of asbestos-containing materials. Non-friable materials such as resilient flooring in good condition are treated differently from friable materials such as surfacing materials and thermal system insulation. Resilient floor covering is classified by the EPA NESHAP as Category I non-friable ACM. If Category I ACM

has become friable, or will become friable, or has been or will be subjected to sanding, grinding, cutting or abrading, it is defined as Regulated ACM by NESHAP, and its wetting, labeling and disposal requirements apply. State and local regulations may have different requirements, and these may be more stringent.

OPTIONAL QUALITY CONTROL MEASURES

This section presents several optional quality control measures that the designer may want to consider when working in occupied buildings, although these measures are not required by OSHA. These optional measures can provide a range of quality assurances for the owner including: assurance that asbestos fibers will not migrate beyond the work area in case of method failure; indication of whether the work practices are performing as expected; and indication of whether additional clean-up is necessary.

- **Critical Barriers:** Critical barriers over openings into the work area may be specified: if the owner or designer wants to physically isolate the work from adjacent areas, for example, in occupied buildings, if there is a possibility that the work may result in elevated airborne asbestos levels, or if there is a requirement for TEM clearance sampling in an adjacent abatement work area. This can be specified by adding the appropriate language describing Critical Barriers from *Section 01526 Temporary Enclosures* directly into the flooring removal section. An alternative is to edit Section 01526 to include only critical barriers and then refer to this edited section in Part 1.1

“Related Documents.”

- **Air Monitoring:** The Owner may specify air monitoring inside the area where work is occurring to verify that the work practices are resulting in airborne asbestos levels within the owner’s limits. Air monitoring may be performed in adjacent areas to assure that these areas are not affected by the work. Air monitoring may be desired to help avoid conflicts with TEM clearance of adjacent asbestos abatement project areas. The portion of *Section 01013 Summary of Work - Asbestos Abatement* that deals with the Owner’s air monitoring should be edited as necessary and referred to in Part 1.1 “Related Documents.” The “Stop Action Levels” set forth in Section 01013 “Summary of Work - Asbestos Abatement.” contains specifications detailing actions to be taken and the effect on the contract if elevated airborne fiber levels are encountered.
- **Full-time On-site Competent Person:** The owner or designer may specify a full-time on-site competent person to supervise the work and help assure that flooring materials stay intact

during the entire work process and that proper work practices are followed throughout the job. This can be accomplished by adding this specification at the beginning of *Part 3 - Execution* under *3.1 General*.

- **Respirators:** The owner or designer may specify respiratory protection for workers to assure minimal exposure to airborne asbestos, including fibers which are not counted under the OSHA standard. If respirators are to be specified for workers, *Section 01562 Respiratory Protection* should be edited as needed and referred to in Part 1.1 "Related Documents" of Section 02085. The specification that respirators are to be worn should also be added at the beginning of *Part 3 - Execution* under *3.1 General*.
- **Worker Decontamination:** The Owner or Designer may specify worker decontamination (e.g. workers HEPA vacuuming off clothing while standing on drop cloths) as an additional assurance that asbestos-containing debris or dust

will not be carried to areas outside the work area, or to workers' homes. If respirators are specified, there should be some sort of worker decontamination procedure to precede removal of respirators. *Section 01561 Worker Protection - Repair and Maintenance* contains work practices such as changing suits and HEPA vacuuming workers as a dry decontamination procedure. These work practices can be adapted by adding them to the flooring removal section at the beginning of *Part 3 - Execution* under *3.1 General*. As an alternative the details of the added work practices can remain in section 01561. In this instance Section 01561 should be referred to in Part 1.1 "Related Documents," and the worker decontamination steps added to the Part 3.1 General. Each added step should have a reference to Section 01561.

- **Other Controls:** If other controls such as bagging and labeling clothing and equipment are specified due to details of a specific project, this can be added to Part 3.1 General.

SECTION 02085 - RESILIENT FLOORING REMOVAL - RESILIENT FLOOR COVERING MANUFACTURERS' RECOMMENDED WORK PRACTICES:

THIS SECTION PRESENTS AN ALTERNATIVE TO AGGRESSIVE PROCEDURES FOR THE REMOVAL OF ASBESTOS-CONTAINING RESILIENT FLOORING. OSHA HAS DETERMINED THAT RESILIENT FLOOR MATERIALS MAY BE REMOVED WITHOUT THE FULL RANGE OF AREA AND WORKER PROTECTION PROCEDURES IF CERTAIN WORK PRACTICES ARE FOLLOWED. THE WORK PRACTICES DESCRIBED IN THIS SECTION HAVE BEEN ACCEPTED BY OSHA, AS AN ALTERNATIVE TO AGGRESSIVE ABATEMENT PRACTICE, FOR THE REMOVAL OF "INTACT" RESILIENT FLOOR COVERING MATERIALS. REFER TO THE EVALUATIONS FOR A DETAILED DISCUSSION ON OSHA AND RESILIENT FLOOR COVERING REMOVAL.

THIS SECTION SHOULD BE USED WITH NORMAL CONSTRUCTION SPECIFICATION SECTIONS FROM "MASTERSPEC" OR OTHER COMPETENT GUIDE SPECIFICATIONS, RATHER THAN WITH NIBS MODEL GUIDE SPECIFICATION SECTIONS. IF NIBS MODEL GUIDE SPECIFICATION SECTION ARE TO BE USED THEY WILL NEED TO BE EXTENSIVELY MODIFIED TO AVOID CONFLICTS WITH THIS SECTION. REFER TO THE EVALUATIONS FOR A DISCUSSION ON SPECIFYING A PROJECT USING THIS SECTION.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

THIS SECTION IS APPROPRIATE FOR USE WITH NORMAL CONSTRUCTION SPECIFICATIONS. IF THIS SECTION IS GOING TO BE USED AS PART OF A NORMAL CONSTRUCTION SPECIFICATION, AND IF DIVISION 1 SPECIFICATION SECTIONS INTENDED FOR NORMAL CONSTRUCTION RATHER THAN AGGRESSIVE ASBESTOS ABATEMENT FROM "MASTERSPEC®," NIBS "SPECTEXT" OR OTHER COMPETENT GUIDESPEC ARE USED, RETAIN THE FOLLOWING PARAGRAPH.

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

DELETE EITHER PARAGRAPH ABOVE OR BELOW.

RETAIN THE FOLLOWING IF DIVISION 1 SPECIFICATION SECTIONS FROM THE NIBS MODEL GUIDE SPECIFICATION ARE BEING USED. IF RESILIENT FLOORING REMOVAL IS THE ONLY ASBESTOS RELATED WORK, THE SPECIFICATION SECTIONS SHOULD BE RE-TITLED "RESILIENT FLOORING REMOVAL" RATHER THAN "AGGRESSIVE ASBESTOS ABATEMENT." FOR LARGE PROJECTS ADDITIONAL ADMINISTRATIVE SECTIONS ON COORDINATION AND SUBMITTALS MAY BE NEEDED. IF THIS IS THE CASE USE SECTIONS FROM "MASTERSPEC®," NIBS "SPECTEXT" OR OTHER COMPETENT GUIDESPEC.

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

- 1. Section 01013 - Summary of the Work - Asbestos Abatement
- 2. Section 01028 - Application for Payment - Asbestos Abatement
- 3. Section 01701 - Contract Closeout - Asbestos Abatement

- C. **Work** described by this section relates to work practices as currently set forth in "Recommended Work Practices for the Removal of Resilient Floor Coverings," revised August, 1995, published by:
 - 1. Resilient Floor Covering Institute
966 Hungerford Drive
Suite 12-B
Rockville, MD 20850
 - 2. Armstrong World Industries, Inc.
P.O. Box 3001
Lancaster, PA 17604

1.2 SUMMARY

THERE ARE ALTERNATIVE AGGRESSIVE REMOVAL METHODS AVAILABLE WHICH HAVE MORE EXTENSIVE REGULATORY REQUIREMENTS. SECTION 02087 "RESILIENT FLOOR COVERING REMOVAL - AGGRESSIVE ASBESTOS ABATEMENT" SETS FORTH REQUIREMENTS FOR THIS TYPE OF WORK. THAT SECTION SHOULD BE REFERENCED WHERE THE PROJECT INCLUDES REMOVAL OF NON-INTACT ASBESTOS-CONTAINING RESILIENT FLOORING MATERIALS, OR WHERE AGGRESSIVE REMOVAL PROCEDURES WILL BE USED FOR PART OF THE PROJECT.

- A. **This Section** includes work practices for removal of resilient floor covering materials which are "intact," and are likely to remain intact during the removal, and can be removed under a negative exposure assessment in compliance with the OSHA standard by appropriately trained workers using the Recommended Work Practices.
- B. **Related Sections:** The following Sections contain requirements that relate to this Section:

RESILIENT FLOOR COVERING IS DEFINED BY THE EPA NESHAP REGULATION AS CATEGORY 1 NON-FRIABLE ACM AND SHOULD BE DISPOSED OF IN ACCORDANCE WITH THAT REGULATION.

- 1. **Division 2 Section 02084 "Disposal of Regulated Asbestos-Containing Material"** for disposal of friable asbestos-containing waste. Note, that resilient floor covering is defined by the EPA NESHAP regulation as Category 1 non-friable ACM and as such is not covered by Section 02084. Resilient floor covering materials should be disposed of in accordance with any applicable state and local regulations.

1.3 DEFINITIONS

- A. **Compliant Work Practices:** Work practices for the removal of flooring material which OSHA has determined will consistently result in exposures below the TWA and excursion limit established by 29 CFR 1926.1101. Recommended Work Practices described in this Section have been recognized by OSHA as Compliant Work Practices.

- B. Recommended Work Practices:** “Recommended Work Practices for the Removal of Resilient Floor Coverings,” revised August, 1995, published by the Resilient Floor Covering Institute (RFCI) and Armstrong World Industries, Inc.
- C. Friable:** Material that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.
- D. Intact:** means that ACM has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix. The incidental breakage of flooring materials, or slicing of sheet vinyl floor covering with a sharp edged instrument, during removal operations conducted in accordance with the Recommended Work Practices does not mean that the materials are not removed in an intact conditions. Intact resilient floor covering materials will be rendered friable if subjected to sanding, sawing or other aggressive operations.
- E. Competent Person:** An individual with the training and experience required by OSHA for a Competent Person involved in removal of intact flooring material using compliant work practices (12 hours of training). The competent person will supervise the work of this section, and is responsible for the health and safety of workers at the flooring material removal job site. The competent person must have authority to stop work, and take corrective action.
- F. Initial Exposure Assessment:** An inspection made by a Competent Person of the job site prior to the start of removal operations for the purpose of determining if the requirements of a negative exposure assessment are met.
- G. Negative Exposure Assessment:** Based on data in the rulemaking record, OSHA has determined that worker exposures will consistently be below the TWA and excursion limit during removal of intact flooring material when compliant work practices are used. As such, a Competent Person may make a negative exposure assessment when:
1. Recommended Work Practices will be used.
 2. Workers are properly trained.
 3. The resilient flooring is intact and is likely to remain intact throughout the removal process.

1.4 WORKER PROTECTION

THE FOLLOWING ARE WORKER PROTECTION REQUIREMENTS THAT ARE IN THE OSHA ASBESTOS STANDARD 29 CFR 1926.1101 AND THE COMPLIANCE DIRECTIVE CPL 2-2.63, NOVEMBER 3, 1995. WORKER PROTECTION BEYOND THAT REQUIRED BY OSHA COULD BE SPECIFIED. IF ADDITIONAL WORKER PROTECTION MEASURES (SUCH AS RESPIRATORS; HEPA VACUUMING OR CHANGING OUT OF WORK CLOTHING WHEN LEAVING THE IMMEDIATE WORK AREA; BAGGING AND LABELING OF CLOTHING, WORK BOOTS, GLOVES AND EQUIPMENT BEFORE LEAVING IMMEDIATE WORK AREA) ARE TO BE SPECIFIED, APPROPRIATE LANGUAGE SHOULD BE ADDED TO THIS SPECIFICATION SECTION. REFER TO THE EVALUATIONS FOR ADDITIONAL DISCUSSION ON THE TOPIC.

STATE OR LOCAL REGULATIONS COULD HAVE DIFFERENT OR MORE STRINGENT REQUIREMENTS FOR WORKER AND COMPETENT PERSON TRAINING THAN THE FOLLOWING.

- A. **Worker Training:** Workers using the Recommended Work Practices for the intact removal of resilient floor covering materials must have completed an 8-hour training program as required by the OSHA regulation 29 CFR 1926.1101(k) and the Compliance Directive CPL 2-2.63 Appendix D, covering asbestos subjects as well as training in the Recommended Work Practices. Workers with this amount of training only are not permitted to continue working if the material becomes non-intact.

- B. **Competent Person:** Engage a person experienced in the use of the Recommended Work Practices who has completed an 8-hour worker training program and additional 4 hours of training as required by the OSHA regulation 29 CFR 1926.1101(k) and the Compliance Directive CPL 2-2.63 Appendix D, for a Competent Person involved in removal of intact flooring material using compliant work practices. Competent Persons with this amount of training only are not permitted to continue working if the material becomes non-intact.

DELETE THE FOLLOWING IF NO STATE OR LOCAL REQUIREMENT. REVISE AS REQUIRED TO CORRESPOND WITH APPLICABLE CODE OR REGULATION.

- C. **State and Local Requirements:** All workers are to be trained, certified and accredited as required by state or local regulation.

- D. **Medical Surveillance:** Workers who engage in the removal of asbestos-containing flooring materials for more than 30 days per year (one hour or more per day) must receive medical surveillance. This requires a medical examination within 10 working days following the 30th day of exposure.

- E. **Prohibitions in work area:** Require that workers NOT eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the Work Area.

- F. **Certificate of Worker Acknowledgment:** Have each worker who is at the job site or who will enter the work area, fill out and sign a copy of the Certificate of Worker's Acknowledgment found at the end of this section.

1.5 QUALITY ASSURANCE

- A. **Notifications:** Before the start of Work notify the following of the presence and location of ACM and of the planned removal activity:
 - 1. Employees performing the work.
 - 2. Employers of employees working in the area (not separated from the work area by either a wall, closed door or window or other impermeable barrier).

- 3. The building owner.

B. Regulatory Compliance: Comply with provisions of the following:

- 1. OSHA Construction Standard for Asbestos 29 CFR 1926.1101
- 2. OSHA Compliance Directive CPL 2-2.63 November 3, 1995, Inspection Procedures for Occupational Exposures to Asbestos Final Rule 29 CFR Parts 1910.1001, 1926.1101, and 1915.1001. .
- 3. OSHA 29 CFR 1926.2 through 35

GENERALLY DELETE THE FOLLOWING, EXCEPT FOR SCHOOL PROJECT.

- 4. AHERA Regulation 40 CFR 763 Sub-Part E

FOLLOWING IS A CATCH ALL. IT IS PREFERABLE TO CITE THE SPECIFIC REGULATIONS THAT APPLY

- 5. Applicable state and local regulations.

DEPENDING ON THE PARTICULAR CIRCUMSTANCES OF A PROJECT, THE DESIGNER MAY WANT TO SPECIFY ADDITIONAL QUALITY ASSURANCE MEASURES SUCH AS THE USE OF CRITICAL BARRIERS, AIR MONITORING, OR A FULL TIME ON-SITE COMPETENT PERSON. REFER TO EVALUATION FOR DISCUSSION. ON THIS MATTER.

C. Non-Intact Material: If the resilient flooring materials become non-intact during the work, stop work until the job can be evaluated by a competent person. Do not resume work until:

- 1. The job can be evaluated and supervised by a competent person who has completed a training course meeting the criteria of EPA’s Model Accreditation Plan for supervisors, and
- 2. The work will be carried out by workers who have completed training meeting the criteria of the EPA’s Model Accreditation Plan for asbestos abatement workers.
- 3. The work will be carried out in accordance with worker and area protection specified in Section 02087.

1.6 SUBMITTALS

THE OWNER MAY WANT REASSURANCE THAT THE CONTRACTOR IS COMPLYING WITH OSHA. THIS CAN BE ACCOMPLISHED BY HAVING THE CONTRACTOR SUBMIT A COPY OF THE NEGATIVE EXPOSURE ASSESSMENT. INCLUDE THIS SUBSECTION IF SUCH A SUBMISSION IS DESIRED. DELETE THE ENTIRE PARAGRAPH ON SUBMITTALS IF SUBMISSION OF THE NEGATIVE EXPOSURE ASSESSMENT TO THE OWNER OR DESIGNER IS NOT GOING TO BE REQUIRED. THE FOLLOWING REQUIRES SUBMISSION TO THE OWNER, EDIT AS REQUIRED IF SUBMISSION IS GOING TO BE MADE TO THE DESIGNER. THIS SECTION DEPENDS ON A COMPETENT PERSON MAKING A NEGATIVE EXPOSURE ASSESSMENT (NEA). THE DESIGNER SHOULD UNDERSTAND THE DETAILS OF ISSUES SURROUNDING THE NEGATIVE EXPOSURE ASSESSMENT. SEE EVALUATION FOR A DISCUSSION ABOUT THE USE OF THIS SECTION AND THE REQUIREMENTS FOR A NEGATIVE EXPOSURE ASSESSMENT.

A. Negative Exposure Assessment: Before starting any work submit a Negative Exposure Assessment certified by a Competent Person to the Owner. If a Negative Exposure Assessment cannot be made, report the reasons and any corrective action that would result in a Negative Exposure Assessment. The certification must be signed and dated by a Competent Person and be based on an Initial Assessment of the work of this contract. A copy of the negative exposure assessment should be retained by the employer of the Competent Person. The certification must include:

1. The name and signature of the Competent Person making the Assessment.
2. Certification that the Competent Person has been trained as required by OSHA for work on intact resilient flooring.
3. A description of the work including:
 - a. Name and address of facility where the work is to occur.
 - b. Description of location within the facility where work is to occur.
4. Certification that:
 - a. Recommended Work Practices will be used.
 - b. Workers will be properly trained as required by OSHA for work on intact resilient flooring.
 - c. The resilient flooring is intact and is likely to remain intact throughout the removal process.

GENERALLY RETAIN THE FOLLOWING, DELETE ONLY IF THE RFCI/ARMSTRONG FORM IS NOT GOING TO BE USED. THE RFCI/ARMSTRONG FORM IS MUCH MORE COMPLETE THAN THE REQUIREMENTS ABOVE, AND IS WIDELY AVAILABLE TO CONTRACTORS THAT DO THIS TYPE OF WORK.

5. Complete and submit to the Owner the job form from “Using Compliant Work Practices to Remove Resilient Floor Covering” published by the Resilient Floor Covering Institute (RFCI) and Armstrong World Industries, Inc. This form is to be signed by a Competent Person. Retain a copy of the form.
6. Certificate of Worker Acknowledgment: Submit an original signed copy of the Certificate of Worker’s Acknowledgment found at the end of this section, for each worker who is to be at the job site or who will enter the work area.

PART 2 - PRODUCTS:

IN A STUDY DONE UNDER THE AUSPICES OF THE RESILIENT FLOOR COVERING MANUFACTURERS, SOME OF THE MOST EFFECTIVE WETTING AGENTS FOR FIBER WETTING OF THE FELT BACKING IN SHEET FLOORING REMOVAL WERE FOUND IN "LIQUID DISHWASHING DETERGENTS" STATED TO CONTAIN "ANIONIC, NONIONIC, AND AMPHOTERIC SURFACTANTS". THE MANUFACTURERS RECOMMEND THAT 16 OZ. (0.47 LITERS) OF DETERGENT BE MIXED WITH ONE GALLON (3.79 LITERS) OF WARM WATER. THE MANUFACTURERS ALSO CAUTION THAT RESILIENT FLOORING BECOMES SLIPPERY WHEN WETTED WITH A DETERGENT SOLUTION. FLOOR TILE SHOULD BE WETTED [MISTED] PRIOR TO REMOVAL WHERE THE TILES ARE NOT HEATED.

2.1 MATERIALS

A. Wetting Materials: For wetting prior to disturbance of asbestos-containing sheet flooring or asphaltic adhesive, use liquid dishwashing detergent that contains anionic, nonionic, and amphoteric surfactants.

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

RETAIN ABOVE FOR NONPROPRIETARY OR BELOW FOR SEMIPROPRIETARY SPECIFICATION. REFER TO DIVISION-1 SECTION "SUBSTITUTIONS." ABOVE IS THE CURRENT LANGUAGE REPLACING FORMER "OR EQUAL" CLAUSES.

2. **Manufacturer:** Subject to compliance with requirements, provide products of one of the following:

THE FOLLOWING IS A LIST OF FIRMS BELIEVED TO MANUFACTURE LIQUID DISHWASHING DETERGENT WITH ANIONIC, NONIONIC AND AMPHOTERIC SURFACTANTS. NO MANUFACTURERS HAVE BEEN KNOWINGLY EXCLUDED AND NO ATTEMPT HAS BEEN MADE TO EVALUATE THESE PRODUCTS. ADDITIONAL SUPPLIERS MAY EXIST. PRODUCT LITERATURE AND LABELS SHOULD BE USED TO EVALUATE THESE PRODUCTS AND TO VERIFY THAT LISTED PRODUCTS COMPLY WITH THE SPECIFICATIONS AND MEET PROJECT REQUIREMENTS. VERIFY THAT PRODUCTS INDICATED ARE STILL BEING MANUFACTURED WITH THE SAME FORMULA. EDIT OR ADD TO THE LIST AS APPROPRIATE TO THE PROJECT REQUIREMENTS.

- a. Procter & Gamble Ivory Liquid
Cincinnati, Ohio 45202

B. Waste Bag: Large size heavy-duty impermeable trash bag made from 6 mil (0.15 mm) thick polyethylene. Identify with a label stating "DANGER, CONTAINS ASBESTOS FIBERS, AVOID CREATING DUST, CANCER AND LUNG DISEASE HAZARD."

C. Waste Container: Closed leak-tight container. Identify with a label stating "DANGER, CONTAINS ASBESTOS FIBERS, AVOID CREATING DUST, CANCER AND LUNG DISEASE HAZARD."

D. Scrapers: Broad stiff-bladed wall or floor scrapers. Heavy-duty short or long handled scraper.

- E. **Cutting Sand:** No. 1 sandblasting sand (clean, sharp, coarse cutting sand).
- F. **Terrazzo Floor Machine:** Terrazzo or low-speed floor machine fitted with a floor plate attachment (similar to Clark Assembly 500202-6).
- G. **Removal Solution:** Solution used to remove adhesive residue. e.g. Mop on, mop off, no machine scrub - wax stripping solution.
- H. **Floor Pad:** Black floor scrubbing pad.
- I. **HEPA Filter Vacuum Cleaners:** Use wet/dry tank-type vacuum cleaner equipped with a filter and metal floor attachment (no brush).
 - 1. **Available Manufacturers:** Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

RETAIN ABOVE FOR NONPROPRIETARY OR BELOW FOR SEMI-PROPRIETARY SPECIFICATION. REFER TO DIVISION-1 SECTION "PRODUCTS AND SUBSTITUTIONS." ABOVE IS THE CURRENT LANGUAGE REPLACING FORMER "OR EQUAL" CLAUSES.

- 2. **Manufacturer:** Subject to compliance with requirements, provide products of one of the following:

THE FOLLOWING IS A LIST OF FIRMS BELIEVED TO MANUFACTURE THESE HEPA VACUUMS. IT IS NOT KNOWN IF THESE MANUFACTURERS PRODUCE A VACUUM THAT IS A WET/DRY TANK-TYPE WITH FILTER AND METAL FLOOR TOOL ATTACHMENT. THIS SHOULD BE VERIFIED AND THE FOLLOWING LIST EDITED AS REQUIRED. NO MANUFACTURERS HAVE BEEN KNOWINGLY EXCLUDED AND NO ATTEMPT HAS BEEN MADE TO EVALUATE THESE PRODUCTS. ADDITIONAL SUPPLIERS MAY EXIST. PRODUCT LITERATURE SHOULD BE USED TO EVALUATE THESE PRODUCTS AND TO VERIFY THAT LISTED PRODUCTS COMPLY WITH THE SPECIFICATIONS AND MEET PROJECT REQUIREMENTS. VERIFY THAT PRODUCTS INDICATED ARE STILL BEING MANUFACTURED. EDIT OR ADD TO THE LIST AS APPROPRIATE TO THE PROJECT REQUIREMENTS.

- | | | |
|----|---|---------------------------|
| a. | Nilfisk of America, Inc.
225 Great Valley Parkway
Malvern, PA 19355
(800) 645-3475 | HEPA-Filtered Vacuums |
| b. | Minuteman International, Inc.
111 South Rohlwing Road
Addison, IL 60101
(708) 627-6900 | Minuteman
HEPA Vacuums |
| c. | Pullman-Holt (White) Corporation
PO Box 16647 | HEPA-Filtered Vacuums |

Tampa, FL 33617
(813) 645-3475

THE FOLLOWING EQUIPMENT IS BEING MARKETED PRIMARILY FOR RESILIENT FLOORING REMOVAL. THIS EQUIPMENT SHOULD BE INVESTIGATED AND EVALUATED BY THE PROJECT DESIGNER.

INFRARED HEATERS WITH AUTOMATIC CONTROL ARE USED PRIMARILY FOR TILE REMOVAL, RATHER THAN FOR REMOVAL OF SHEET GOODS.

J. Thermal Equipment with Automatic Control:

EQUIPMENT UTILIZING CONTROLLED INFRARED RADIANT HEAT TO MAKE THE RESILIENT FLOOR TILES AND ADHESIVE SOFT AND PLIABLE FOR REMOVAL. AFTER TILE REMOVAL THE MASTIC MUST STILL BE DEALT WITH IN THE NORMAL MANNER. THIS EQUIPMENT GENERALLY UTILIZES CONTROLLED INFRARED RADIANT HEAT TO MAKE THE TILE AND MASTIC SOFT AND PLIABLE FOR REMOVAL.

THE PROJECT DESIGNER SHOULD EVALUATE THE EQUIPMENT TO DETERMINE IF THERE ARE LIKELY TO BE PROBLEMS OF FUMES, VAPORS OR FIRES. THIS MAY MAKE SOME MACHINES UNSUITABLE FOR USE ON SOME SUBSTRATES. IT MAY BE NECESSARY TO SPECIFY GREATER VENTILATION AND FIRE WATCHES. THE EQUIPMENT REPORTEDLY WORKS WELL WITH ASBESTOS AND NON-ASBESTOS RESILIENT TILE. OPEN-FLAME AND PROPANE-FUELED DEVICES SHOULD NOT BE USED.

REVISE THIS SECTION AS NECESSARY TO COMPLY WITH MANUFACTURER'S INSTRUCTIONS AND THE RESILIENT FLOOR COVERING MANUFACTURERS' RECOMMENDED WORK PRACTICES.

DELETE THIS SECTION IF THERMAL EQUIPMENT WITH AUTOMATIC CONTROL IS NOT GOING TO BE USED FOR THE PROJECT.

- 1. Available Manufacturers:** Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

RETAIN ABOVE FOR NONPROPRIETARY OR BELOW FOR SEMI-PROPRIETARY SPECIFICATION. REFER TO DIVISION-1 SECTION "SUBSTITUTIONS."

- 2. Manufacturer:** Subject to compliance with requirements, provide products of one of the following:

THE FOLLOWING IS A LIST OF FIRMS BELIEVED TO MANUFACTURE THIS PRODUCT. NO MANUFACTURERS HAVE BEEN INTENTIONALLY EXCLUDED AND NO ATTEMPT HAS BEEN MADE TO EVALUATE THESE PRODUCTS. ADDITIONAL SUPPLIERS MAY EXIST. PRODUCT LITERATURE SHOULD BE USED TO EVALUATE THESE PRODUCTS AND TO VERIFY THAT LISTED PRODUCTS COMPLY WITH THE SPECIFICATIONS AND MEET PROJECT REQUIREMENTS. VERIFY THAT PRODUCTS INDICATED ARE STILL BEING MANUFACTURED. EDIT OR ADD TO THE LIST AS APPROPRIATE TO THE PROJECT REQUIREMENTS.

- a. Enviromethods, Inc. "Delta T" series
P.O. Box 6151
Wolcott, CT 06716
203-879-5527
- b. UAS Automation Systems, Inc. "ATR" (Automated Tile Removal) series
4524 Parkway Commerce Blvd.
Orlando, FL 32808
407-294-8551 or 800-969-8837

- K. **Miscellaneous Equipment:** Provide as needed the following equipment: utility or hook knife, ground fault circuit interrupter, hand sprayer, hammer or mallet, commercial-type, hand-held, hot-air gun or radiant heat source, hand-held rubbing stones, slip resistant shoes or boots, chisel, heavy gloves, duct tape, safety glasses.
- L. **Use a Ground Fault Circuit Interrupter (GFCI)** for any electrical connections in a wet environment.

PART 3 - EXECUTION

UNLESS THE FLOORING MATERIAL IS KNOWN TO BE A NON-ASBESTOS PRODUCT, IT SHOULD BE ASSUMED TO CONTAIN ASBESTOS OR BE TESTED FOR ASBESTOS.

THE RESILIENT FLOOR COVERING MANUFACTURERS' RECOMMENDED WORK PRACTICES ARE FOR ALL RESILIENT FLOORS REGARDLESS OF THEIR ASBESTOS CONTENT.

THE RESILIENT FLOOR COVERING MANUFACTURERS INDICATE THAT REMOVAL OF IN-PLACE RESILIENT FLOOR COVERING IS THE FINAL ALTERNATIVE. IT IS ALWAYS PREFERABLE TO INSTALL A NEW FLOOR OVER AN EXISTING FLOOR WHICH MAY OR MAY NOT CONTAIN ASBESTOS RATHER THAN TO REMOVE THAT FLOOR. THIS SECTION DESCRIBES THE INDUSTRY WORK PRACTICES TO BE USED IF THE FLOORING IS TO BE REMOVED.

3.1 GENERAL:

- A. **Assume an asbestos content:** Unless indicated in the contract documents that a flooring material is a non-asbestos product, assume it contains asbestos and treat it in the manner prescribed by the following procedures which are based on the "Recommended Work Practices for the Removal of Resilient Floor Coverings," published by the Resilient Floor Covering Institute and Armstrong World Industries. Do not sand, dry sweep, dry scrape, drill, saw, beadblast, or mechanically chip or pulverize existing resilient flooring, backing lining felt or asphaltic "cut back" adhesives.
- B. **Before beginning removal** of any resilient flooring materials complete the following

THE FOLLOWING ARE PROCEDURES FOUND IN THE PUBLICATION "RECOMMENDED WORK PRACTICES FOR RESILIENT FLOOR COVERINGS", REVISED AUGUST, 1995, ISSUED BY THE RESILIENT FLOOR COVERING INSTITUTE AND ARMSTRONG WORLD INDUSTRIES, INC. THIS SECTION DEPENDS ON A COMPETENT PERSON MAKING A NEGATIVE EXPOSURE ASSESSMENT (NEA). THE DESIGNER SHOULD UNDERSTAND THE DETAILS OF ISSUES SURROUNDING THE NEGATIVE EXPOSURE ASSESSMENT. SEE EVALUATION A DISCUSSION ABOUT THE USE OF THIS SECTION AND THE REQUIREMENTS FOR A NEGATIVE EXPOSURE ASSESSMENT.

1. **Negative Exposure Assessment:** Before starting any work require that a Competent Person make an Initial Exposure Assessment of the resilient flooring to be removed. Begin work only if the Competent Person makes a Negative Exposure Assessment. Based on data in the rulemaking record, OSHA has determined that worker exposures will consistently be below the TWA and excursion limit during removal of intact flooring material when compliant work practices are used. As such, a Competent Person may make a negative exposure assessment when:
 - a. Recommended Work Practices will be used.
 - b. Workers are properly trained.
 - c. The resilient flooring is intact and is likely to remain intact throughout the removal process.

If a Negative Exposure Assessment cannot be made, report the reasons and any corrective action that would result in a Negative Exposure Assessment.

THE WORK OF THIS SECTION DEPENDS ON THE RESILIENT FLOORING MATERIAL REMAINING INTACT THROUGHOUT THE REMOVAL PROCESS. IF THE MATERIALS BECOME NON-INTACT WORK MUST STOP AND WORKERS AND A COMPETENT PERSON WITH ADDITIONAL TRAINING, AS WELL AS ADDITIONAL WORK PRACTICES AND ENGINEERING CONTROLS ARE REQUIRED TO CONTINUE THE WORK. REFER TO THE INTRODUCTION FOR A DISCUSSION ON THIS TOPIC. IF THE SPECIFICS OF THE PROJECT REQUIRE MORE STRINGENT CONTROL, A REQUIREMENT CAN BE ADDED THAT THE COMPETENT PERSON REMAIN CONTINUOUSLY ON-SITE AND SUPERVISE THE WORK TO DETERMINE IF IT REMAINS INTACT THROUGHOUT THE REMOVAL PROCESS. SEE EVALUATION FOR A DISCUSSION ABOUT THE USE OF THIS SECTION AND THE REQUIREMENTS FOR A NEGATIVE EXPOSURE ASSESSMENT.

2. **Notifications:** Before the start of Work notify the following of the presence and location of ACM and of the planned removal activity:
 - a. Employees performing the work.
 - b. Employers of employees working in the area (not separated from the work area by either a wall, closed door or window or other impermeable barrier).
 - c. The building owner.

IF PROJECT SPECIFICS REQUIRE GREATER ISOLATION OF THE WORK AREA, CRITICAL BARRIERS COULD BE INSTALLED OVER ALL OPENINGS INTO THE AREA. REFER TO THE INTRODUCTION PAGE 59 FOR ADDITIONAL DISCUSSION ON THIS TOPIC.

OSHA REQUIRES WARNING SIGNS TO BE COMPREHENSIBLE TO NON-ENGLISH SPEAKING WORKERS.

3. **Demarcation:** The work area must be demarcated or access must be limited to workers performing the removal. Post warning signs that read:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY

IF PROJECT SPECIFICS REQUIRE, ADDITIONAL WORK PRACTICES SUCH AS CHANGING OR HEPA VACUUMING WORKER CLOTHING BEFORE LEAVING WORK AREA; AND WET WIPING, BAGGING AND LABELING OF CLOTHING AND EQUIPMENT BEFORE LEAVING WORK AREA CAN BE ADDED. REFER TO INTRODUCTION PAGE 59 FOR ADDITIONAL INFORMATION.

4. **Preparation:** Prior to beginning the removal of resilient floor covering complete the following:

- a. Remove appliances and furniture from the work area.
- b. Remove binding strips or other restrictive molding from doorways, walls, etc.
- c. Mix a detergent solution (16 ounces (0.473 liters) of liquid dishwashing detergent to 1 gallon (3.79 liters) of water) and pour into a garden sprayer.
- d. Clean the entire floor using a wet/dry vacuum cleaner equipped with a HEPA filtration system with disposable bag and metal floor attachment (no brush). Do not dry sweep; do not create dust.
- e. Precaution: Resilient flooring becomes slippery when wet with a detergent solution. Use caution to contain the solution in the immediate work area. Stand on a sheet of plywood or non-slip surface while working on wet surfaces.
- f. After vacuuming, used HEPA filters and cleaner bags should be removed according to manufacturer's instructions and place in a waste bag or waste container.

- C. **Disposal of materials:** Dispose of friable materials in accordance with Section 02084 "Disposal of Regulated Asbestos Containing Material". Dispose of Category I non-friable waste in accordance with State and Local Regulations.

3.2 REMOVAL OF PERIPHERALLY-ADHERED RESILIENT SHEET VINYL FLOORING:

- A. **Use the following procedures** to remove adhered portions of the sheet vinyl floor covering:

1. The manufacturer's recommend that two workers be utilized to perform sheet flooring removal. The Contractor should consider the particular circumstances of the project and determine the advisability of requiring a minimum of two workers as a quality assurance measure.
2. Make a slice with a sharp knife into the adhered floor covering 4 to 8 inches(102 to 203 mm) wide, parallel with the walls, around the perimeter of the room.

3. Starting on either side of the entrance door, pry up the corner of the first strip, separating the backing layer. As the strip is being removed, spray a constant mist of the detergent solution into the delamination nip point to minimize any airborne dust particles. When done properly, any felt remaining on the floor and on the back of the strip will be thoroughly wet. Peel the strip either by pulling upward at an angle that permits the best separation or by rolling around a core.
 4. Roll the strip tightly as it is removed. Tie or tape securely and immediately place in a waste bag or waste container for disposal.
 5. Remove all of the exposed residual felt by wet scraping, using the procedures under, "Wet Scraping Residual Felt," in this section, before proceeding with removal of the unadhered portion of the floor covering. Residual felt must be removed by wet scraping. Do not sand or dry scrape in any way. Do not dry sweep. Avoid creating dust.
 6. Remove additional strips, following the above procedure, as necessary to expose unadhered subfloor area.
 7. Continue around the room completely removing the adhered flooring along the perimeter, one strip at a time following the procedures above. Do not remove the flooring at the entrance doorway until all other flooring has been completely removed.
 8. Vacuum up any residue of wet felt scrapings immediately with a wet/dry vacuum equipped with a HEPA filter and metal floor attachment (no brush).
 9. After vacuuming, used HEPA filters and cleaner bags should be removed according to the manufacturers' instructions and placed in a waste bag or waste container.
 10. Remove the unadhered flooring as detailed in the article in this Section on "Removal of Unadhered Resilient Floor Covering."
- B. Disposal of materials:** Dispose of friable materials in accordance with Section 02084 "Disposal of Regulated Asbestos Containing Material". Dispose of Category I non-friable waste in accordance with State and Local Regulations.

3.3 REMOVAL OF UNADHERED RESILIENT FLOOR COVERING:

- A. Use the following procedure** to remove loose laid or the unadhered portion of peripherally adhered sheet resilient floor covering:
1. The manufacturer's recommend that two workers be utilized to perform sheet flooring removal. The Contractor should consider the particular circumstances of the project and

determine the advisability of requiring a minimum of two workers as a quality assurance measure.

2. Start at the end of the room farthest from the entrance doorway and slice a strip 18 inches (0.46m) wide in the unadhered flooring.
3. Remove the sliced strips while spraying the detergent solution into the separation nip point. Do not stand or kneel on the exposed subfloor during the removal process.
4. Roll the wet strip tightly and tie or tape to secure. Continue working toward the doorway, slicing each strip and removing it while spraying the separation nip point with the detergent solution. Place the strips while still wet into a waste bag or waste container.
5. After removing three strips of flooring, vacuum the exposed floor using a wet/dry vacuum equipped with a HEPA filter with metal floor attachment (no brush).
6. Seams and other adhered areas should be removed as they are encountered. Strip the wear surface while spraying the detergent solution into the delamination nip point. Wet scrape the residual felt as described under, " Wet Scraping Residual Felt" in this section.
7. Continue removing flooring, doing only one three-strip area at a time, until the entire floor has been completely removed.
8. When the whole floor has been completely removed, let it dry. Vacuum up any dust using a vacuum with a HEPA filtration system and a metal floor attachment (no brush). Stand only in vacuumed areas as work proceeds across the floor. Position the vacuum cleaner so that discharge air does not blow on the floor being cleaned. Do not dry sweep. Avoid creating dust.
9. After vacuuming, used HEPA filters and cleaner bags should be removed according to the manufacturers' instructions and placed in a waste bag or waste container.
10. When floor is dry, install new resilient floor covering following manufacturers' installation recommendations.

- B. Disposal of materials:** Dispose of friable materials in accordance with Section 02084 "Disposal of Regulated Asbestos Containing Material". Dispose of Category I non-friable waste in accordance with State and Local Regulations.

3.4 REMOVAL OF ADHERED RESILIENT SHEET VINYL FLOORING:

- A. Use the following procedure** to completely remove adhered resilient sheet flooring.

1. The manufacturer's recommend that two workers be utilized to perform sheet flooring removal. The Contractor should consider the particular circumstances of the project and determine the advisability of requiring a minimum of two workers as a quality assurance measure.
2. Make a series of parallel slices, with a knife, 4 to 8 inches (102 to 203 mm) apart parallel to a wall.
3. Start at the end of the room farthest from the entrance door. Pry up the corner of the first strip, separating the backing layer. As the strip is being removed, spray a constant mist of the detergent solution into the delamination nip point to minimize any airborne dust particles. When done properly, any felt remaining on the floor and on the back of the strip will be thoroughly wet. Peel the strip either by pulling upward at an angle that permits the best separation or by rolling around a core.
4. Roll the strip tightly as it is removed. Tie or tape securely and immediately place in a waste bag or waste container for disposal.
5. If parts of the foam inner-layer remain stuck to the backing, attempt to eliminate this condition by pulling the strips loose from the opposite end. Peel the foam inner-layer from the floor while spraying the detergent solution into the delamination nip point.
6. Some resilient flooring is not readily strippable by hand. When these conditions are encountered, a sharp stiff blade scraper may be used to assist cleavage of the wear layer from felt. If this procedure is used the distance between slices must be narrowed to a width of 3 to 5 inches (76 to 127 mm).
7. Regardless of whether stripping of the wear surface is accomplished by hand peeling alone or with the assistance of a stiff blade scraper, detergent solution must be sprayed into the delamination nip point to minimize any airborne dust particles.
8. After removing three strips of the wear surface, remove the remaining residual felt by wet scraping using the procedures "Wet Scraping Residual Felt," in this section. During the stripping process, do not stand or walk on the exposed felt.
9. After removing the three strips of flooring and residual felt vacuum the exposed floor using a wet/dry vacuum equipped with a HEPA filter and metal floor attachment (no brush).
10. Repeat the operation (wetting the delamination nip point while removing the next three strips, then wet scrape the residual felt, then vacuum the exposed floor). Do only one three-strip area at a time until the entire floor has been completely removed.
11. Place all flooring strips and felt scrapings immediately while wet into waste bags or waste containers. Close full bags and containers tightly and seal securely for disposal.

12. Do not dry sweep. Avoid creating dust.
 13. When all floor covering has been completely removed, let the floor dry. Vacuum up any dirt using a vacuum with a HEPA filtration system and a metal floor attachment (no brush). Stand only in the vacuumed area as the work proceeds across the floor. Position the vacuum cleaner so the discharge air does not blow on the floor being cleaned.
 14. After vacuuming, used HEPA filters and cleaner bags should be removed according to manufacturer's instructions and place in a waste bag or waste container.
 15. When the floor is dry, it is ready to have a new resilient floor covering installed. Follow the floor covering manufacturer's instructions.
- B. Disposal of materials:** Dispose of friable materials in accordance with Section 02084 "Disposal of Regulated Asbestos Containing Material". Dispose of Category I non-friable waste in accordance with State and Local Regulations.

3.5 WET SCRAPING RESIDUAL FELT:

ALWAYS RETAIN THIS SECTION IF THE SECTION ON "REMOVAL OF PERIPHERALLY ADHERED RESILIENT SHEET VINYL FLOORING," "REMOVAL OF UNADHERED RESILIENT FLOOR COVERING," OR "REMOVAL OF ADHERED RESILIENT SHEET VINYL FLOORING," IS INCLUDED.

- A. Remove any residual felt** remaining on the floor after removal of the wear layer of adhered vinyl sheet flooring by using the following procedure:
1. Thoroughly wet residual felt with detergent solution. Avoid excessive wetting or standing water. Wait a few minutes to allow solution to soak into felt.
 2. Stand on the remaining floor covering (not the felt) and use a stiff-bladed scraper or a floor scraper with a replaceable blade to remove the wet felt.
 3. Re-wet the felt if the solution has not completely penetrated, if drying occurs or if dry felt is exposed during scraping. Scrape all felt from each three-strip area before proceeding further. Pick up the scrapings as they are removed from the floor and place in a waste bag or waste container.

IF THE RECOMMENDED WORK PRACTICES ARE FOLLOWED PROPERLY THERE SHOULD NOT BE ENOUGH WATER USED TO CAUSE PROBLEMS TO WOOD FLOORS.

IF DESIRED ADD LANGUAGE TO THE FOLLOWING TO EXPLAIN WHO IS RESPONSIBLE IF WATER DAMAGE OCCURS.

4. Wet residual felt as above but do not excessively soak or flood wood floors with detergent solution. Excessive water can damage wood floors to the extent that new underlayment could be required. A floor that has been wet scraped must be allowed to dry thoroughly before new resilient flooring is installed.
5. As removal progresses, vacuum the area using a vacuum cleaner equipped with a HEPA filter and metal floor attachment (no brush).
6. After removal is complete and the entire floor has dried, vacuum using a HEPA vacuum with a metal floor attachment (no brush).
7. After vacuuming, used HEPA filters and cleaner bags should be removed according to the manufacturers' instructions and placed in a waste bag or waste container.

B. Disposal of materials: Dispose of friable materials in accordance with Section 02084 "Disposal of Regulated Asbestos Containing Material". Dispose of Category I non-friable waste in accordance with State and Local Regulations.

3.6 REMOVAL OF RESILIENT TILE FLOOR COVERING:

- A. Use the following procedure** to remove resilient tile floor covering:
1. Begin removal in an area that receives the minimum foot traffic.
 2. Floor tiles must be wetted (misted with a garden sprayer) before actual removal begins, unless heat will be used to remove tiles.
 3. Start removal by carefully wedging a wall scraper in the seam of two adjoining tiles and gradually forcing the edge of one of the tiles up and away from the floor. Continue to force the balance of the tile up by working the scraper beneath the tile. Exert both a forward pressure and a twisting action on the blade to promote release of the tile from the adhesive and the floor.
 4. When the first tile is removed place it, without breaking it further into smaller pieces, in a waste bag or waste container.
 5. After the first tile is removed and accessibility to other tiles is improved, force the wall scraper under the exposed edge of another tile. Continue to exert a prying twisting force to the scraper as it is moved under the tile until the tile releases from the floor. Again, dispose of the tile, and succeeding tiles, by placing in a waste bag or waste container without additional breaking.

6. Force the scraper through tightly-adhered areas by striking the scraper handle with a hammer using blows of moderate force while maintaining the scraper at a 25 to 30 degree angle to the floor. The resilient floor covering manufacturers' work practices recommend use of safety goggles during this work.
7. Continue to wet (mist) the tiles throughout the procedure
8. It should be the goal to remove individual tiles as a complete unit, although breakage of tiles is unavoidable.
9. If the procedure above is inadequate to loosen tiles use heat to soften adhesive, or alternatively, without first prying up floor tiles using a scraper, thoroughly heat the tile(s) with a hot air gun or radiant heat source until the heat penetrates through the tile and softens the adhesive, and remove tiles by hand or by using a scraper. The resilient floor covering manufacturers work practices recommend that the hot air gun or radiant heat source, tiles and adhesive be carefully handled to avoid burns, and that heated tiles and adhesive be handled only with suitable glove protection for hands. Caution: Over-heating resilient tile might produce harmful vapors, and a respirator with organic cartridges might be needed.
10. Deposit tiles in a waste bag or leak-tight container. Do not attempt to break tiles after they are in bag.

THE FOLLOWING SECTION REFERS TO REMOVAL OF ASBESTOS-CONTAINING ASPHALTIC "CUT-BACK" ADHESIVE. IN GENERAL, ONLY ASPHALTIC "CUT-BACK" ADHESIVES CONTAIN ASBESTOS. ON JOB SITES, THESE ADHESIVES APPEAR AS A BLACK TARRY MATERIAL. OTHER TYPES OF ADHESIVES SUCH AS LATEX ADHESIVES ARE GENERALLY FREE OF ASBESTOS, TAN IN COLOR, AND ARE LIKELY TO BE DRIED OUT AND BRITTLE.

MANY LIQUID ADHESIVE REMOVAL PRODUCTS EMPLOY SOLVENTS WHICH LEAVE A RESIDUE WITHIN THE SUB-FLOOR THAT CAN ADVERSELY AFFECT THE NEW ADHESIVE OR FLOOR COVERING. THE WARRANTIES PROVIDED BY THE MANUFACTURERS OF THE NEW FLOORING MATERIALS WILL NOT COVER INSTANCES WHERE EXISTING SUB-FLOOR CONDITIONS DAMAGE THEIR PRODUCTS OR AFFECT ITS INSTALLATION.

IF NEW RESILIENT FLOOR TILE IS TO BE INSTALLED OVER A CONCRETE SUBFLOOR USING AN ASPHALTIC ADHESIVE, THE RESIDUAL ASPHALTIC "CUT-BACK" ADHESIVE MUST BE LEFT SO THAT NO RIDGES OR PUDDLES ARE EVIDENT AND WHAT REMAINS IS A THIN, SMOOTH COAT. IF THIS IS THE CASE AND REMOVAL OF ALL ASBESTOS-CONTAINING ADHESIVE IS NOT A GOAL OF THE PROJECT, THEN RETAIN THE FOLLOWING PARAGRAPH AND DELETE THE ARTICLES ON WET REMOVAL OF ADHESIVE.

B. Wet Scrape Residual Adhesive: As small areas of subfloor are cleared of tile, wet scrape residual asphaltic "cut-back" adhesive so that no ridges or puddles are evident and what remains is a thin, smooth film.

1. Start in the corner of the room farthest from the entrance door and moisten an area of the adhesive (approximately 3 by 10 feet) (0.91m by 3.05m) with water mixed with liquid

dishwashing detergent (to aid in wetting the adhesive). Wet scrape with a stiff-bladed wall or floor scraper removing ridges and any loose adhesives.

2. Place loosened adhesive residues into a waste bag or waste container
3. Wet vacuum standing water with HEPA wet/dry vacuum.
4. Continue the above steps until what remains of the residual asphaltic “cut-back” adhesive is a thin, smooth film.

INSTALLATION OF SHEET FLOORING AND SPECIALTY TILES REQUIRING LATEX, RESIN, OR EPOXY ADHESIVE WILL REQUIRE THAT THE RESIDUAL ASPHALTIC ADHESIVE BE COMPLETELY REMOVED. IN THIS INSTANCE OR IF A GOAL OF THE PROJECT IS THE COMPLETE REMOVAL OF ASBESTOS-CONTAINING ADHESIVE RETAIN THE FOLLOWING WET ADHESIVE REMOVAL PROCEDURES THAT ARE APPROPRIATE FOR THE PROJECT.

THE FOLLOWING ARTICLES REFER TO REMOVAL OF ASBESTOS-CONTAINING ASPHALTIC “CUT-BACK” ADHESIVE FROM CONCRETE. IN GENERAL, THE ONLY ASBESTOS CONTAINING ADHESIVES ENCOUNTERED WILL BE ASPHALTIC “CUT-BACK” ADHESIVES. THIS TYPE OF ADHESIVE WAS MOST COMMONLY USED ON CONCRETE FLOORS. THE FOLLOWING IS A WET REMOVAL METHOD. WET ADHESIVE REMOVAL IS DAMAGING FOR WOOD FLOORS. IF ASBESTOS-CONTAINING ADHESIVE IS FOUND ON WOOD UNDERLAYMENT, IT IS PREFERABLE TO REMOVE THE UNDERLAYMENT. IF IT IS ON WOOD FLOORING, IT IS PREFERABLE TO COVER THE MASTIC WITH A NEW UNDERLAYMENT, IF THE FOLLOWING IS TO BE USED ON WOOD FLOORS, AT A MINIMUM, REVISE TO INCLUDE REPAIR OF THE FLOOR AFTER REMOVAL IS COMPLETE. ON THE JOB-SITE, ASPHALTIC “CUT BACK” ADHESIVES APPEAR AS A BLACK TARRY MATERIAL. OTHER TYPES OF ADHESIVES SUCH AS LATEX ADHESIVES ARE GENERALLY FREE OF ASBESTOS, TAN IN COLOR, AND ARE LIKELY TO BE DRIED OUT AND BRITTLE. SOMETIMES ADHESIVES ARE NOT SEPARATELY SAMPLED AND MAY BE CONSIDERED AS ASBESTOS-CONTAINING SIMPLY BECAUSE THEY ARE ASSOCIATED WITH AN ASBESTOS-CONTAINING FLOORING. IF AN ADHESIVE IS IDENTIFIED AS CONTAINING ASBESTOS, AND IS NOT BLACK AND TARRY, IT MAY BE WORTH VERIFYING ITS ASBESTOS CONTENT, PARTICULARLY FOR WORK ON A WOOD FLOOR.

C. Wet Remove residue of adhesive from Concrete: Completely remove residue of adhesive left after removal of resilient floor tile using the following procedure:

1. Place cutting sand (enough to cover an area of approximately 6 by 6 foot (1.83 by 1.83 m) into a container, add water mixed with liquid detergent (1 ounce (30 ml) of liquid dishwashing detergent to 1 gallon (3.79 liters) of water) to dampen the sand (20 pounds (9.07 kg) of sand to ½ gallon (1.89 liters) of solution).
2. Place sand over a 6 by 6 foot (1.83 by 1.83 m) area and wet remove the existing adhesive residue using a terrazzo floor machine. Keep sand under rubbing stones when operating the machine. The sand and subfloor must be continuously kept wet.
3. Occasionally push away cutting sand from the subfloor with a wall or floor scraper to check for complete removal.
4. Remove adhesive around the edge of the room and missed areas with dampened, clean, sharp, cutting sand and a hand held rubbing stone.

5. Wet-scrape sand into a pile using a stiff-bladed floor or wall scraper and place sand and adhesive residue in a waste bag or waste container.
6. Rinse area with clear clean water using a hand sprayer. Worker's boots should also be rinsed and cleaned.
7. Wet-vacuum standing water with HEPA wet/dry vacuum with a metal floor attachment (no brush).
8. Continue with the above steps until the entire room is complete.
9. Allow subfloor to dry and vacuum up any remaining dirt or sand using a vacuum equipped with a HEPA filter and metal floor attachment (no brush).
10. After vacuuming, used HEPA filters and cleaner bags should be removed according to the manufacturers' instructions and placed in a waste bag or waste container.
11. Wet-wipe and/or wash down all equipment used during the work.

D. Wet Remove residue of adhesive from Concrete: Completely remove residue of adhesive left after removal of resilient floor tile using the following procedure:

1. Start in the corner of the room farthest from the entrance door. Put the removal solution onto the residual adhesive with a hand sprayer or mop over a 6' X 6' (1.82m X 1.82m) Put enough removal solution (e.g. "mop on, mop off, no machine scrub" stripping solution) to ensure that the area is thoroughly wet. Allow the area to soak for 5-10 minutes. Remove the adhesive using a floor machine equipped with a black floor pad (or equivalent). The subfloor must be kept continuously wet.
2. Occasionally push away the adhesive slurry from the subfloor with a wall or floor scraper to check for complete removal. Continue to use the floor machine, equipped with the black pad, in the same area until the concrete subfloor is cleaned to the desired degree.
3. Remove adhesive around the edge of the room, from missed areas, and from areas difficult to reach with the machine with a hand held piece of the black floor pad using the above procedure.
4. Wet HEPA vacuum the adhesive slurry. When the HEPA vacuum is full, place a commercially suitable water absorbent into the HEPA container until the adhesive slurry is absorbed. Place adhesive waste in a waste bag or waste container.
5. Rinse area with clear clean water using a hand sprayer or mop. Worker's boots should also be rinsed and cleaned.

6. Wet-vacuum standing water with HEPA wet/dry vacuum with a metal floor attachment (no brush).
 7. Continue with the above steps until the entire room is complete.
 8. Allow subfloor to dry and vacuum using a vacuum equipped with a HEPA filter and metal floor attachment (no brush).
 9. After vacuuming, used HEPA filters and cleaner bags should be removed according to the manufacturers' instructions and placed in a waste bag or waste container.
 10. Wet-wipe and/or wash down all equipment used during the work.
- E. **Disposal of materials:** Dispose of friable materials in accordance with Section 02084 "Disposal of Regulated Asbestos Containing Material". Dispose of Category I non-friable waste in accordance with State and Local Regulations.

THE REMOVAL OF RESILIENT FLOORING OVER WOOD SUBFLOORS USING THE WET-STRIPPING/WET-SCRAPING METHOD MAY NOT BE PRACTICAL IN CASES WHERE MULTIPLE LAYERS OF FLOOR COVERING ARE PRESENT, WHERE NON-RECOMMENDED UNDERLAYMENTS WERE USED, OR WHERE THE FLOORING WAS MADE WITH A HEAVY FOAM BACKING. AS AN ALTERNATIVE THE WOOD UNDERLAYMENT CAN BE REMOVED WITH THE FLOORING ADHERED TO IT USING THE FOLLOWING PROCEDURE.

3.7 REMOVAL OF THIN WOOD UNDERLAYMENT:

- A. **Thin wood underlayment covered with existing sheet vinyl.** Remove thin wood underlayment covered with existing sheet-vinyl-resilient flooring, with the flooring adhered. Use the following procedure:
1. Locate the joints of the underlayment panel farthest from the entrance door.
 2. Slice a strip of the flooring 4 to 8 inches (102 to 203 mm) wide centered over the underlayment joint in the panel being removed.
 3. Pry up the corner of the strip separating the backing layer. As the strip is being removed, spray a constant mist of the detergent solution into the delamination nip point to minimize any airborne dust particles. When done properly, any felt remaining on the floor and on the back of the strip will be thoroughly wet. Peel the strip either by pulling upward at an angle that permits the best separation or by rolling around a core.
 4. Roll the strip tightly as it is removed. Tie or tape securely and place in a waste bag or waste container for disposal.

5. Remove all of the exposed residual felt by wet scraping using the procedures of, "Wet Scraping Residual Felt," in this section before proceeding.
6. Drive a cold chisel using a hammer or mallet into the joint at a corner of the panel. Now use the chisel to pry the panel up far enough to insert a pry bar. Continue working around the panel, lifting all edges slowly. Use one or two pry bars to pry up the underlayment panel a little at a time until the panel is completely loose and can be removed. Attempt to remove the panel in one piece.
7. If the panel breaks, slice the resilient flooring at the break and spray the detergent solution onto the exposed felt. Allow the solution to penetrate for a few minutes, then continue lifting the broken underlayment.
8. Remove each underlayment panel or piece from the work areas as it is lifted. The resilient floor covering manufacturers work practices recommend that workers wear heavy gloves when handling removed panels, and be very careful of wood splinters and protruding fasteners. Flatten the fasteners with a hammer and stack the panels back to back on pallets or place in dumpster. Identify panels with a label stating, "DANGER, CONTAINS ASBESTOS FIBERS, AVOID CREATING DUST, CANCER AND LUNG DISEASE HAZARD." Dispose of in an approved landfill only.
9. Place any small wood or flooring scrapes in a waste bag or waste container.
10. If the underlayment extends under cabinets or wall partitions, slice through the flooring with a knife as close to the vertical surface as possible, deeply scoring the panel.
11. After each panel has been lifted and removed from the work area, pull up any remaining nails or fasteners in the subfloor.
12. Continue removing each underlayment panel in sequence following the above procedures.
13. When the underlayment / resilient flooring removal is complete, vacuum with a HEPA filter and metal floor Attachment (no brush).
14. After vacuuming, used HEPA filters and cleaner bags should be removed according to the manufacturers' instructions and placed in a waste bag or waste container.

WOOD UNDERLAYMENT CAN BE REMOVED WITH THE FLOOR TILES ADHERED TO IT USING THE FOLLOWING PROCEDURE.
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B. Removal of thin wood underlayment covered with existing tile. Remove the underlayment with the tile adhered using the following procedure:

1. Floor tiles must be wetted (misted with a garden sprayer) before actual removal begins, unless heat will be used to remove tiles.

2. Starting at the doorway or a floor ventilation vent, locate a joint in an underlayment board.
3. Start removal by carefully wedging a wall scraper in the seam of two adjoining tiles and gradually force the edge of one of the tiles up and away from the floor. Continue to force the balance of the tile up by working the scraper beneath the tile. Exert both a forward pressure and a twisting action on the blade to promote release of the tile from the adhesive and the floor.
4. When the first tile is removed place it, without breaking it further into smaller pieces, in a waste bag or waste container.
5. After the first tile is removed and accessibility to other tiles is improved, force the wall scraper under the exposed edge of another tile. Continue to exert a prying twisting force to the scraper as it is moved under the tile until the tile releases from the floor. Again, dispose of the tile, and succeeding tiles, by placing in a waste bag or waste container, without additional breaking.
6. Force the scraper through tightly adhered areas by striking the scraper handle with a hammer using blows of moderate force while maintaining the scraper at a 25 to 30 degree angle to the floor. Use eye protectives and other protective equipment required for the work.
7. Continue to wet (mist) the tiles throughout the procedure.
8. It should be the goal to remove individual tiles as a complete unit, although breakage of tiles is unavoidable.
9. If the procedure above is inadequate to loosen tiles use heat to soften adhesive. Thoroughly heat the tile(s) with a hot air gun or radiant heat source until the heat penetrates through the tile and softens the adhesive. The resilient floor covering manufacturers work practices recommend that the hot air gun or radiant heat source, tiles and adhesive be carefully handled to avoid burns, and that heated tiles and adhesive be handled only with suitable glove protection for hands.
10. After all tiles have been removed from the underlayment joints, drive a chisel, using a hammer or a mallet, between the underlayment board and the subfloor. Use the chisel to pry up the underlayment enough to insert a pry bar and remove the chisel. Slowly and carefully use pry bars to pry up the underlayment board a little at a time until the board is completely loose and can be removed.
11. Use caution to avoid breaking the underlayment board. The underlayment board should be removed in one piece. If the underlayment board breaks, heat and slice the tile at the break, then continue to remove broken underlayment.

12. The Resilient floor covering manufacturers work practices recommend that workers wear heavy gloves and be careful of wood splinter and fasteners sticking out the back of the underlayment. Remove each underlayment board (or piece of board) from the work area as soon as it has been pried up to avoid injuries (such as stepping on a nail). Flatten with a hammer fasteners protruding from a removed board. Place removed underlayment boards on skids with the nails pointing downward. Wrap skid with 6 mil (0.15 mm) polyethylene sheet plastic and secure with duct tape. Label panels in the same manner as waste bags.
 13. After each board has been removed, pull out any nails or fasteners still in the subfloor. Dispose of these and any other nails or fasteners which have been removed but are still lying in the work area.
 14. After the first board has been removed a chisel is not needed to start removal of boards. Work pry board under the exposed edge of the next board.
 15. When removal of underlayment/existing tile floor is complete, thoroughly check the exposed subfloor. Re-nail loose areas and reset "popped" nails and fasteners.
 16. Vacuum up any dirt in the area using a vacuum cleaner equipped with a HEPA filter and metal floor attachment (no brush).
 17. After vacuuming, used HEPA filters and cleaner bags should be removed according to the manufacturers' instructions and placed in a waste bag or waste container.
- C. **Disposal of materials:** Dispose of friable materials in accordance with Section 02084 "Disposal of Regulated Asbestos Containing Material". Dispose of Category I non-friable waste in accordance with State and Local Regulations.

END OF SECTION - 02085

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME _____ DATE _____

PROJECT ADDRESS _____

CONTRACTOR'S NAME _____

WORKING WITH ASBESTOS CAN BE DANGEROUS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCER. IF YOU SMOKE AND INHALE ASBESTOS FIBERS THE CHANCE THAT YOU WILL DEVELOP LUNG CANCER IS GREATER THAN THAT OF THE NON-SMOKING PUBLIC.

Your employer's contract with the Owner for the above project requires that: You be trained in safe work practices and in the use of the equipment found on the job. If you do OSHA Class II work (such as removing asbestos-containing resilient flooring) you may be required to receive a medical examination. These things are to have been done at no cost to you.

EDIT THE FOLLOWING AS APPROPRIATE

WORKERS REMOVING CLASS II MATERIALS THAT ARE FRIABLE, OR BECOME FRIABLE IN THE COURSE OF THE REMOVAL, ARE REQUIRED TO MEET THE FULL EPA TRAINING PROGRAM

TRAINING COURSE: You must have completed an 8-hour training course that covers asbestos subjects as well as use of the Manufacturer's Recommended Work Practices (Compliant Work Practices) for removing resilient flooring. This training is adequate for the removal of intact resilient flooring. If this is the only training you have had then you are not allowed to remove resilient flooring that is not intact, or has become non-intact (as defined by OSHA)during removal.

MEDICAL EXAMINATION: Removal of asbestos-containing resilient flooring is OSHA Class II work. If you perform OSHA Class I, II and III work (including removal of resilient flooring) for more than one hour per day (taking into account the entire time spent on the removal operation including cleanup) for 30 or more days per year , then a medical examination must be made available to you by your employer at no cost to you., within 10 working days following the thirtieth day of such work. This examination must include: health history, pulmonary function tests and may include an evaluation of a chest x-ray.

YOUR TRAINING ALLOWS YOU TO REMOVE ONLY INTACT RESILIENT FLOORING THAT REMAINS INTACT DURING REMOVAL. IF YOU ENCOUNTER NON-INTACT RESILIENT FLOORING OR IF THE FLOORING BECOMES NOT-INTACT (AS DEFINED BY OSHA) DURING REMOVAL THEN STOP WORK AND REPORT TO YOUR SUPERVISOR.

By signing this document you are acknowledging only that the Owner of the building you are about to work in has advised you of your rights to training and protection relative to your employer.

Signature _____ Social Security No _____

Printed Name _____ Witness _____

SECTION 02086 - HAZARDOUS WASTE MANAGEMENT

PCB CONTAINING FLUORESCENT LIGHT BALLASTS AND MERCURY SWITCHES FROM THERMOSTATS ARE WASTE MATERIALS FREQUENTLY ENCOUNTERED ON ASBESTOS ABATEMENT PROJECTS. A PROJECT CAN EASILY GENERATE A SUFFICIENT QUANTITY OF THESE MATERIALS THAT THEY MUST BE MANAGED AS HAZARDOUS WASTE. FOR EXAMPLE, IT ONLY TAKES 20 TO 25 FLUORESCENT LIGHT BALLASTS TO HAVE A SUFFICIENT QUANTITY OF PCB'S TO REACH THE RCRA REGULATORY LIMIT. THIS SECTION DESCRIBES THE MANAGEMENT OF THESE MATERIALS AS HAZARDOUS WASTE. IF THE PROJECT INVOLVES OTHER HAZARDOUS MATERIALS THEN THE PROJECT DESIGNER SHOULD SEEK THE ADVICE OF AN INDIVIDUAL KNOWLEDGEABLE IN THIS AREA.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

THIS SECTION IS REQUIRED IF HAZARDOUS WASTE WILL BE GENERATED DUE TO DEMOLITION OF BUILDING MATERIALS THAT HAVE COMPONENTS THAT QUALIFY AS HAZARDOUS MATERIALS, SUCH AS LEAD-BASED PAINT PCB-CONTAINING FLUORESCENT LIGHT BALLASTS AND MERCURY THERMOSTATS, REFER TO THE NIBS PUBLICATION "GUIDE SPECIFICATIONS FOR REDUCING LEAD-BASED PAINT HAZARDS" FOR ADDITIONAL INFORMATION ON DEALING WITH LEAD-BASED PAINT.

1.2 RELATED SECTIONS

- A. **Section 01092 Codes and Regulations - Asbestos Abatement** describes federal, state and local regulations applicable to asbestos.
- B. **Section 02084 Disposal of Regulated Asbestos-Containing Material** describes the handling and disposal of asbestos-containing waste.

1.3 DESCRIPTION OF THE WORK:

- A. **This section describes** the segregation, packaging, labeling, transport, and disposal of waste materials generated by demolition activities and the subsequent shipment of properly packaged and labeled waste materials to an approved disposal site.

1.4 CODES AND REGULATIONS

THE REGULATIONS REFERENCED IN THIS SUBSECTION COULD BE ADDED TO SECTION 01092 "CODES AND REGULATIONS - ASBESTOS ABATEMENT" AND THIS ENTIRE SUBSECTION DELETED. IT IS IMPORTANT THAT COMPLIANCE WITH REGULATIONS BE MADE A CONTRACT REQUIREMENT, SO THAT VIOLATION OF A REGULATION BECOMES A CONTRACT NON-COMPLIANCE ISSUE. OTHERWISE, THERE IS NOT WAY TO ENFORCE REGULATORY COMPLIANCE UNDER THE CONTRACT.

- A. General Applicability of Codes and Regulations:** Except to the extent that more explicit or more stringent requirements are written directly into the Contract Documents, all applicable codes and regulations have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the Contract Documents, or as if published copies are bound herewith.
- B. Contractor Responsibility:** The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to hazardous waste management and disposal. Hold the Owner and Designer harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of the Contractor, the Contractor's employees, or Subcontractors.

ALWAYS INCLUDE THE FOLLOWING SECTION ON FEDERAL REGULATIONS.

- C. Federal Requirements:** which govern the management, hauling and disposal of hazardous waste include but are not limited to the following:
1. **DOT:** U. S. Department of Transportation, including but not limited to:
 - a. Hazardous Substances
Title 49, Part 171 and 172 of the Code of Federal Regulations
 - b. Hazardous Material Regulations
General Awareness and Training Requirements for Handlers, Loaders and Drivers
Title 49, Parts 171-180 of the Code of Federal Regulations
 - c. Hazardous Material Regulations
Editorial and Technical Revisions
Title 49, Parts 171-180 of the Code of Federal Regulations
 2. **EPA:** U. S. Environmental Protection Agency (EPA), including but not limited to:
 - a. Management of Hazardous Wastes Resource Conservation and Recovery Act (RCRA)
Title 40, Parts 260- 268 of the Code of Federal Regulations

INCLUDE THE FOLLOWING IF THERE ARE STATE REGULATIONS THAT APPLY.

- D. **State Requirements:** which govern the management, hauling and disposal of hazardous waste include but are not limited to the following:

INSERT REFERENCE TO APPLICABLE STATE REGULATIONS.

DELETE EITHER ABOVE OR BELOW. ABOVE ACCOMPANIED BY A LISTING OF APPLICABLE REGULATIONS IS PREFERABLE. BELOW IS A CATCH ALL APPROACH.

- E. **State Requirements:** Abide by all state requirements which govern the management, hauling and disposal of hazardous waste.

INCLUDE THE FOLLOWING AND ADD REFERENCE TO SPECIFIC REGULATION. DELETE IF THERE ARE NO LOCAL REGULATIONS THAT APPLY TO THE WORK.

- F. **Local Requirements:** which govern the management, hauling and disposal of hazardous waste include but are not limited to the following:

INSERT REFERENCE TO APPLICABLE LOCAL REGULATIONS.

DELETE EITHER ABOVE OR BELOW. ABOVE ACCOMPANIED BY A LISTING OF APPLICABLE REGULATIONS IS PREFERABLE. BELOW IS A CATCH ALL APPROACH.

- G. **Local Requirements:** Abide by all local requirements which govern the management, hauling and disposal of hazardous waste.

1.5 DEFINITIONS:

DEFINITIONS IN THIS SUBSECTION COULD BE ADDED TO SECTION 01097 "REFERENCE STANDARDS AND DEFINITIONS - ASBESTOS ABATEMENT," AND THIS ENTIRE SUBSECTION DELETED.

- A. **Toxicity Characteristic Leaching Procedure (TCLP):** A laboratory test method to determine the mobility of both organic and inorganic analytes present in liquid, solid, and multiphasic wastes performed in accordance with test methods required under 40 CFR Part 268.

1.6 SUBMITTALS:

- A. Before Start of Work:** Submit the following to the Designer for review. Do not start work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use.
- 1. Copy of state and local licenses** for waste hauler.
 - 2. U.S. EPA Identification Number** of waste hauler.
 - 3. Name and address of waste disposal facility** where hazardous waste materials are to be disposed including:
 - a. Contact person and telephone number.
 - b. Copy of state license and permit
 - c. Disposal facility permits
 - 4. Specimen copy** of Uniform Hazardous Waste Manifest form.
 - 5. Copy** of EPA "Notice of Hazardous Waste activity" form
 - 6. Copy** of forms requires by state and local agencies
 - 7. Sample** of disposal label to be used.
- B. During Work:** Submit the following as required by the work.
- 1. TCLP test results**, as required to characterize waste for segregation and packaging purposes.
 - 2. Submit copies** of all executed manifests and disposal site receipts to the Designer.

PART 2 - PRODUCTS:

2.1 MATERIALS

- A. Disposal Bags:** Provide 6 mil (0.15 mm) thick leak-tight polyethylene bags.
- B. DOT Hazardous Waste Disposal Drums:** Provide DOT 17-H Open -Top Drums (55 gallon) in accordance with DOT regulations title 49 CFR Parts 173, 178, and 179.

- C. **DOT Hazardous Waste Labels:** in accordance with DOT regulations Title 49 CFR parts 173, 178, and 179.

PART 3 - EXECUTION

3.1 GENERAL

- A. **Do not mix potentially hazardous waste streams.** Where feasible, separate each type of hazardous waste from other types of hazardous wastes, from asbestos waste and from construction waste.
- B. **Segregate, package, label, transport and dispose** of Hazardous Waste in accordance with DOT, EPA, State and Local regulations.

3.2 HAZARDOUS WASTE DESIGNATION

- A. **Where not otherwise designated** by the Owner as Hazardous waste, characterize all suspect waste products by conducting representative TCLP testing.

IT IS GENERALLY PREFERABLE TO DETERMINE WHAT MATERIALS MUST BE MANAGED AS HAZARDOUS WASTE DURING DESIGN OF THE PROJECT. THIS INFORMATION CAN BE GIVEN TO THE CONTRACTOR ON THE DRAWINGS, THROUGH A SCHEDULE, OR BY SUPPLYING TEST REPORTS. THE FOLLOWING IS AN EXAMPLE OF LANGUAGE THAT CAN BE USED IF A SCHEDULE IS TO BE USED TO REVISE OR DELETE THE FOLLOWING AS NECESSARY

- B. **Testing of components by use of TCLP** was completed by Owner’s consultant prior to initiating this project.
 - 1. A schedule of materials that must be managed as hazardous waste is attached at the end of this section.

DELETE EITHER ABOVE OR BELOW. A SCHEDULE IS LESS AMBIGUOUS.

- 2. The report on TCLP testing performed by the Owner entitled <insert name> prepared by <insert name of entity that prepared report> dated <insert date> is bound in the project manual. All materials designated as “Hazardous Materials” in that report are to be managed according to requirements of this section.
- 3. Additional TCLP testing obtained at the site for contractor’s use in fulfilling waste management requirements is at contractor’s expense.

INCLUDE THE FOLLOWING WHERE TESTING IS REQUIRED.

- C. Representative sampling of waste products will be in accordance with EPA Document SW 846.
- D. TCLP test analysis will be performed in accordance with EPA Method 1311.

THE FOLLOWING ALLOWS FOR THE HAZARDOUS WASTES MOST FREQUENTLY ENCOUNTERED ON ASBESTOS ABATEMENT PROJECTS. REVISE TO MEET PROJECT REQUIREMENTS. CONSULT WITH A HAZARDOUS WASTE MANAGEMENT EXPERT.

3.3 HAZARDOUS WASTE:

EDIT FOLLOWING AS REQUIRED BY PROJECT SPECIFICS.

- A. The following waste products are designated by the Owner as non-salvageable and as Hazardous Waste Types:
 - 1. **Waste Type A:** PCB waste.
 - a. PCB-containing ballasts from fluorescent light fixtures.
 - 2. **Waste Type B:** Mercury-containing waste.
 - a. Thermostats with mercury switches. Individually bagged mercury-containing thermostats.
 - b. Fluorescent, and mercury-vapor lamps.

3.4 Hazardous Waste Packaging and Labeling: Package each segregated Hazardous Waste Type , A and B, in specified containers as follows. **IMPORTANT: Do Not Mix Waste Streams:**

- A. **Waste Type A**
 - 1. Package in DOT 17-H Open-Top Drums
 - 2. Fill to capacity only with Waste Type A (Do Not Mix Waste Stream types).
 - 3. Install gasket on lid, apply lock ring, and seal.
 - 4. Apply Hazardous Waste Label to drum side.

5. Enter DOT Shipping Data as follows: RQ Waste Polychlorinated Biphenols, 9, UN-2315, PG-II, (M001).
6. Adjacent to each label, enter the date indicating when waste was first placed in each drum.

B. Waste Type B

1. Package in DOT 17-H Open-Top Drums with Polyethylene disposal Bag liners
2. Fill liner bags only with Waste Type B (Do Not Mix Waste Stream types); then neck liner bags down into DOT 17-H Open-Top Drum and seal with duct tape.
3. Install gasket on lid, apply lock ring, and seal.
4. Apply Hazardous Waste Label to drum side.
5. Enter DOT Shipping Data as follows: RQ Hazardous Waste Solid, NOS, 9, NA3077, PG-III, (D009).
6. Adjacent to each label, enter the date indicating when waste was first placed in each drum.

ALWAYS KEEP THE FOLLOWING.

- C. Sealed and Labeled Containers:** maintain all containers in a continuously sealed condition after they have been sealed.
1. Do not reopen sealed containers.
 2. Do not place additional waste in sealed containers.

CONSULT WITH LOCAL AUTHORITIES ON STORAGE REQUIREMENTS AND REVISE THE FOLLOWING AS REQUIRED.

3.5 Temporary Storage: Partially filled containers of hazardous waste may be stored at the work site for intermittent packaging provided that:

- A. Each container is properly labeled when it is first placed in service;
- B. Each container remains closed at all times except when compatible waste types are added; and

- C. When moved from site to site, each container remains within the geographic boundaries of the facility without moving nor crossing public access highways.

3.6 Removal of Hazardous Wastes: Immediately seal containers of hazardous waste as each the container is filled. Remove containers of hazardous waste from the work site **within seventy-two (72) hours of being filled.**

- A. **Transporting filled containers** from the work site to an approved disposal site or recycling center.
- B. **Continuously maintain custody** of all hazardous material generated at the work site including security, short-term storage, transportation and disposition until custody is transferred to an approved disposal site or recycling center. Document continuous chain-of custody.
- C. **Do not remove**, or cause to be removed, hazardous waste from Owner’s property without a legally executed Uniform Hazardous Waste manifest .
- D. **At completion of hauling** and disposal of each load submit copy of waste manifest, chain of custody form, and landfill receipt to Designer.

3.7 Recycling and Recovery: Turn over waste which contains materials for which recovery and/or recycling is possible to an approved recycling center. Materials subject to recycling include:

EDIT THE FOLLOWING LIST TO SUIT PROJECT SPECIFICS.

1. Fluorescent light tubes.
2. Thermostats with mercury switches.
3. Lead acid batteries
4. Combustible lead-based painted building components and lead-based paint chips.

INCLUDE THE FOLLOWING ARTICLE ON BACKCHARGES AFTER REVIEW BY THE OWNER AND PREFERABLY THE OWNER’S ATTORNEY. CONSIDER DELETING THIS ARTICLE IF BACKCHARGES AND “OWNER’S RIGHT TO DO WORK” ARE COVERED ADEQUATELY IN GENERAL CONDITIONS OF THE CONTRACT. CONVERSELY, LIABILITY FOR CLEANUP COSTS UNDER CERCLA/RCRA FOR POLLUTION AFTER DISPOSAL MAY NOT BE RECOVERABLE WITHOUT ADEQUATELY BINDING THE CONTRACTOR.

3.8 Backcharges:

- A. Where contractor fails to fulfill packaging, handling, transport or disposal requirements as outlined herein, Owner will charge back to the Contractor all costs associated with insuring that hazardous wastes are segregated, packaged, transported and disposed of in accordance with all applicable Federal and State regulations.
- B. Environmental pollution of Owner's property or other environments resulting from Contractor's hazardous waste management activities will be promptly remediated under Owner's direction, to the Owner's sole satisfaction, and at the Contractor's sole expense.
- C. Contractor agrees to either reimburse the Owner, or reduce the Contract amount by change order to cover all costs associated with waste re-packaging, waste re-segregation, or pollution remediation efforts.

3.9 Removal of Non-Hazardous Waste Materials:

- A. Transport and legally dispose of non-hazardous waste products, materials, residues and refuse at a location not on Owner's property.
- B. Non-hazardous waste products, materials, residues and refuse include, but are not necessarily limited to:
 - 1. Materials which are determined to be non-hazardous wastes through objective sampling in accordance with EPA Document SW-846 and laboratory analysis in accordance with EPA Method 1311.
 - 2. Emptied hazardous material containers: containers holding a material with constituents listed on the MSDS as hazardous.
 - a. When a container is emptied of its hazardous contents by pouring or scraping so that less than one inch of material remains in the bottom of the container, the container is considered "empty" and is not in itself a hazardous waste.
 - b. Emptied hazardous material containers may be disposed of as construction debris waste (i.e. non-hazardous).
 - 3. Personnel protective clothing and safety equipment with de minimis or trace contamination, as determined by visual inspection by Owner's Representative.
- C. Keep premises in a clean and orderly condition during performance of abatement work.

- D.** Place non-hazardous construction debris wastes on a daily basis in secure containers for local landfill disposal.

END OF SECTION - 02086

SECTION 02087 - RESILIENT FLOORING REMOVAL - AGGRESSIVE ASBESTOS ABATEMENT

GENERAL COMMENTS

Section 02087 "Resilient Flooring Removal - Aggressive Asbestos Abatement" presents aggressive, mechanical removal methods (e.g. pneumatic spades, mechanical chippers, bead blasters, etc.), which must be performed inside of a negative pressure enclosure.

Section 02087 - "Resilient Flooring Removal - Aggressive Asbestos Abatement" is used to specify the aggressive removal of resilient floor covering using machinery. The emphasis of this section is on aggressive removal. Machinery is used to speed the work. It is expected that the flooring material will be rendered friable. There is a strong possibility that elevated levels of airborne fibers may be generated by the work. As such, work of this section is performed inside of a negative pressure enclosure by asbestos abatement workers. In writing a specification for a project, Section 02087 is used in the same manner as other asbestos removal sections (such as 02081 Removal of Asbestos-Containing Materials) along with other NIBS Guide Specification to produce an asbestos abatement project specification.

This section describes a three part process for the removal of resilient flooring. The work is performed using machinery rather than manual or non-aggressive machine removal methods. The first step is to remove the tiles or sheet material. The second step is to remove any heavy built-up adhesive or mastic, felt, or rubber backing. The final step is the removal of adhesive residue from the floor.

A project may not need all three steps. For example, floor tile removal projects frequently do not need a second step of removing heavy residue or backing materials. The section could be modified to be a two step process of tile removal followed by mastic removal.

This section describes two categories of machinery and methods for removing resilient floor covering. "Resilient flooring removal equipment" describes machinery designed (or at least adapted) for removal of resilient flooring materials, that is in wide use. "Other technologies applied to the work" describes methods and machinery in use for other purposes, but that can be used for resilient flooring removal.

If minimally edited the section will give the contractor great flexibility in using almost any kind of equipment that will get the job done. If the designer wants to restrict the type of equipment used on the project, then the section will need to be edited accordingly. The section is written around the use of "Primary resilient flooring removal equipment," and a three part removal process. . The work practices in this section are based on the use of machinery that was designed (or at least adapted for use) as dedicated resilient flooring removal equipment. This primary resilient flooring removal equipment includes equipment appropriate for all three steps of the removal process. If local practice generally uses other equipment for removal, then this equipment should be should be moved into the appropriate work section

RESILIENT FLOORING REMOVAL EQUIPMENT

The following equipment has either been designed specifically for removal of resilient flooring, or has had long use for this purpose. Aggressive removal of resilient flooring is frequently viewed as a three-part process: removal of the flooring, removal of heavy mastic or backing material, and surface cleaning of the slab.

Tile removal can be accomplished by use of powered spades augmented by use of manual spades in tight areas. The pneumatic spades are described as having greater effectiveness than electric-powered ones. Walk-behind stripping machines (which seem to have originated for removal of glued-down carpet) also offer high production rates.

After the flooring is removed any heavy coatings of built-up mastic, felt backing or rubber backing must be removed. The rotary cutter machine was invented specifically for taking up backings and is the high-production method for accomplishing this work. Manual scrapers also work, but at a slower more labor intensive rate. The rotary cutter efficiently removes mastic, rubber carpet backing, felt backings, roofing felts and any other soft material bonded to concrete. This step is frequently not necessary where flooring mastic, particularly under tiles, is thin. Rotary cutter machines are generally rotary toothed tools that peel the material up in thin strips.

The final step involves cleaning all mastic residue from the slab. Shot blast/bead blast equipment is a commonly used mechanical method for accomplishing this. There is usually a large walk-behind machine that is used on the field of the floor and a smaller edger machine for use near walls. These machines remove all residue and condition the slab for the replacement flooring.

Aggressive high volume machinery described in this section are not appropriate for work on wood floors.

Manual Spades: Hand operated scraper/chisels with long handles and replaceable blades for removal of resilient flooring. Manual

spades are the routine hand tool for removing resilient flooring. These are hand-operated scraper/chisels. They are generally long-handled (up to 5 feet) and often weighted. All have replacement blades. They are forced under the flooring and release it in a manner similar to an ice scraper scraping ice off a sidewalk. The mastic must be removed in a second operation. These tools will remove whole tiles, but can break some of the resilient flooring into smaller pieces during removal. Use of this equipment is also included in Section 02085 "Resilient Flooring Removal - Resilient Floor Covering Manufacturers' Recommended Work Practices."

Powered Spades: Long-handled scraper/chisels used in a full-standing position that have replaceable blades and are pneumatically or electrically-powered to move in a reciprocating (in and out) motion. These are a powered version of the manual spade, and can be expected to result in a faster production rate. The replaceable blades are powered by small portable air compressors or electric motors and move in a reciprocating (in and out) motion. They are used to get under tiles or sheet flooring and lift them up separating them from the mastic. Typically, the flooring will be broken up into small pieces by this process. As with the manual spade, mastic must be removed as a second operation. Powered spades can be either pneumatic or electrically powered, but the pneumatic power spade is generally the tool of choice for high-production rate resilient tile removal. It is efficient, presents no shock hazard and is easy to clean and decontaminate at the completion of the work. Pneumatically powered spades should be equipped with vents and piston seals that prevent compressed air or blow-by from sweeping the floor.

Stripper Machines: These are walking units with blades at the front, driven by electric motors, and move either in a reciprocating (in and out) or an oscillating orbital motion. These machines originated for use in removing glued-down carpet. They are effective in removing resilient flooring, particularly sheet flooring.

These are walking units with a blade at their front. The blade is usually driven by an electric motor and moves either in a reciprocating (in and out) or an oscillating orbital motion, and operates like a motorized spade. As with the spades, mastic must be removed as a second operation. These machines can be expected to have a production rate similar to a powered spade. However, they operate with an electric motor. As such they present a potential shock hazard and are more difficult to clean and decontaminate. These tools normally break the resilient flooring into small pieces during removal

Rotary Cutters: Machine with rotating discs facing flat against the floor with spring-loaded cutters that follow the profile of the floor and removes soft resilient materials by cutting them into thin strips and scraping them from the floor. This machine has been specifically designed for removal of thick concentrations of mastic. These are designed to strip away membranes and heavy elastomeric coatings from concrete slabs. This includes heavy build-ups of mastic, roofing felts, rubberized coatings, carpet backing, and felt backing from resilient flooring. They generally have discs facing flat against the floor with cutters. They remove soft resilient materials by cutting them into thin strips that are scraped from the slab so that they can be swept up. The cutters are spring loaded so that they follow the profile of the floor. This is the machine of choice for high-production rate removal of heavy mastic, felt backing or rubber carpet backing.

Shot Blast/Bead Blast Machines:

These machines send steel shot at high velocity at the concrete floor surface. All have a high-vacuum flow in the blast region to collect dust. The shot is recollected, separated, and recycled continuously. The machines are used only after all the tile and much of the mastic has been removed. Due to the use of steel shot and some metals within the equipment, these machines must be used only on dry surfaces. Due to the nature of the pulverizing and rebounding process of these machines, they are only effective on residues which are no longer resilient. This is the machine of choice for high-production rate removal of

residue of mastic from concrete floors. Caution should be used in specifying the use of shot/bead blast equipment without wetting. This may constitute a dry removal under EPA NESHAP. The EPA Regional NESHAP coordinator must approve in writing any dry removal prior to the start of work. Refer to the NESHAP regulation for specific requirements and notifications.

Infrared Equipment with Automatic Control:

Equipment utilizing controlled infrared radiant heat to make the resilient floor tiles and adhesive soft and pliable for removal. This equipment is an alternative to mechanical removal using some sort of spade. After tile removal the mastic must still be dealt with in the normal manner. This equipment generally utilizes controlled infrared radiant heat to make the tile soft and pliable for removal. The use of infrared heat equipment to remove floors began around 1990 and currently is in wide use as a method to non-aggressively remove resilient floor covering. Air monitoring studies have been conducted on jobs employing infrared heat removal equipment and some of this data has been submitted to OSHA in the Environ Reports and subsequently determined by OSHA as acceptable for use in establishing a "Negative Exposure Assessment" (NEA). The project designer should determine if state or local regulations add requirements for worker protection, enclosure, negative air containment or other requirements beyond OSHA. This should be evaluated by the project designer. The project designer should evaluate the equipment to determine if there are likely to be problems of fumes, vapors or fires. This may make some machines unsuitable for use on some substrates. It may be hazardous to use some machines in an enclosed environment such as an asbestos abatement project area. Other sections of the specification may have to be modified to allow for greater ventilation, fire watches, fire-resistant enclosures, etc. Combination respiratory protection may be needed. Open-flame and propane-fueled devices should not be used. Use of this equipment is also included in Section 02085 "Resilient Flooring Removal - Resilient Floor Covering Manufacturers' Recommended Work Practices."

High Pressure Water Jet: Tools using very high pressure water jets to hydraulically lift tiles. This equipment offers a hydraulic alternative to mechanical removal of tile. After tile removal the mastic must still be dealt with in the normal manner. These tools use very high pressure water jets to hydraulically lift tiles. (Some low flow versions have also been used instead of manual

scraping to remove asbestos-containing fireproofing.) This equipment uses water and may not be appropriate for use where water leakage through the floor may be an issue. One example of such a location is a multi-story building with an underfloor raceway system. This system is not appropriate for wooden floors.

OTHER TECHNOLOGIES APPLIED TO THE WORK

The following are machines that are in use for other purposes but can also be used for resilient flooring removal. They may already be owned by the contractor or more widely available for rent, in which case they may be an acceptable substitute for one of the more specialized machines indicated above.

Terrazzo Grinders: Machines with stones facing flat against the floor that are used wet to remove hard materials with a grinding action. Terrazzo is made by pouring concrete with colored aggregate and colored cement, and then grinding it to a smooth flat surface. The terrazzo grinder uses abrasive stones to grind away a sufficient amount of the aggregate and cement to produce the finished surface. These machines work well when used with wet sand to grind away the residue of adhesive left after resilient flooring removal. The process is a wet one so that airborne fiber levels are minimized. This is the tool recommended by the resilient flooring manufacturers for the removal of adhesive residue. Use of this equipment is also included in Section 02085 "Resilient Flooring Removal - Resilient Floor Covering Manufacturers' Recommended Work Practices."

Rotary Grinders/Surfacers: Machine with discs facing flat against the floor that removes hard materials with a grinding action. These machines were designed to remove high spots in concrete (profiling slabs). They will effectively remove mastic if it is dried and hardened. They are ineffective for removing resilient mastic. These machines can be used

instead of a rotary cutter for dried mastic removal. These machines can be used wet if an industrial diamond cutter is used. Other types of cutters are used dry. These generally have discs facing flat against the floor. They remove hard materials with a grinding action.

Surfacers/Planers/Scarifiers: Machine with a series of small cutters freewheeling on axles mounted on a drum so that the cutters contact the floor surface with a flailing action. These machines were designed to scarify (texture) the surface of concrete, or plane a concrete slab down. As a surfer they will effectively remove mastic if it is dried and hardened. They are ineffective for removing resilient mastic. As a planer it is possible to remove hard tile (VAT) with this machine. It will pulverize the tile. This is likely to be a very dusty operation. Care must be used in selecting these machines as most are gas, diesel, or propane-powered and not appropriate for use in an enclosed abatement work area unless special precautions are taken. These generally have a series of small cutters freewheeling on axles mounted in drum that spins like an old-fashioned reel lawn mower. The cutters contact the concrete surface with a flailing action.

Dry Ice: Dry ice can be used to form a frost layer that breaks the bond between tile and floor. The project designer should evaluate whether these procedures are appropriate for a specific project. The use of dry ice is novel and presents some new problems that must be satisfactorily resolved including: freezing and frost damage to

substrates, carbon dioxide accumulations and potential adverse effects on workers, worker protection for cold to avoid frost-bite, etc. Removal with dry ice has been used primarily in small areas on single tiles, although there are reports of successful use on large areas. Dry ice should be used only with an exhaust type work

area ventilation to avoid a build up of carbon dioxide. The amount of ventilation and quantity of dry ice allowed below should be verified by experimentation.

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SECTION 02087 - RESILIENT FLOORING REMOVAL - AGGRESSIVE ASBESTOS ABATEMENT:

THIS SECTION CAN BE USED TO SPECIFY AGGRESSIVE METHODS FOR THE REMOVAL OF RESILIENT FLOOR COVERING BY USE OF MACHINERY. THE USE OF SOME TYPES OF EQUIPMENT RESULTS IN RENDERING THE RESILIENT FLOOR COVERING FRIABLE. BECAUSE OF THIS, AND THE POSSIBILITY OF GENERATING ELEVATED AIRBORNE FIBER LEVELS DURING THE WORK, THE WORK OF THIS SECTION IS TREATED AS ASBESTOS ABATEMENT.

THE RESILIENT FLOOR COVERING INSTITUTE (RFCI) AND ARMSTRONG WORLD INDUSTRIES (HEREAFTER REFERRED TO AS THE RESILIENT FLOOR COVERING MANUFACTURERS) HAVE DEVELOPED NON-AGGRESSIVE, PRIMARILY MANUAL, WORK PRACTICES THAT APPLY TO THE REMOVAL OF ASBESTOS AND NON-ASBESTOS-CONTAINING RESILIENT FLOOR COVERING MATERIALS. THESE WORK PRACTICES CAN BE FOUND IN SECTION 02085, "RESILIENT FLOORING REMOVAL - RESILIENT FLOOR COVERING MANUFACTURER'S RECOMMENDED WORK PRACTICES"

IN SCHOOL (GRADES K-12), REMOVAL PERFORMED AS AN ABATEMENT ACTION WHICH RENDERS FLOOR COVERING FRIABLE IS COVERED BY EPA ASBESTOS HAZARD EMERGENCY RESPONSE ACT (AHERA, 40 CFR 763.90(I)(5) REGULATIONS, AND DESIGN, CONTRACTOR, AND ABATEMENT WORKER ACCREDITATION, AND AREA CLEARANCE REQUIREMENTS APPLY FOR WORK GREATER THAN SMALL-SCALE, SHORT-DURATION.

SPECIFIERS OF RESILIENT FLOORING REMOVAL SHOULD CONSIDER MEANS TO PREVENT INFLUENCE OF OTHER ASBESTOS RELATED WORK ON ANY CLEARANCE MONITORING (ESPECIALLY USING TRANSMISSION ELECTRON MICROSCOPY (TEM) ANALYSIS) WHICH MAY BE SPECIFIED FOR THE FLOORING REMOVAL. THE REVERSE, I.E., PREVENTING INFLUENCE FROM THE FLOORING REMOVAL PROJECT ON THE TEM CLEARANCES OF OTHER ASBESTOS RELATED WORK, SHOULD ALSO BE CONSIDERED. METHODS TO CONSIDER INCLUDE PROPER SEQUENCING OF THE DIFFERENT REMOVAL PROJECTS.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division - 1 Specification Sections, apply to work of this section.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. Asbestos abatement project requirements to be completed prior to start of the work of this section are set forth in the following sections:
 - 1. 01503 Temporary Facilities - Asbestos Abatement
 - 2. 01513 Temporary Pressure Differential & Air Circulation System
 - 3. 01526 Temporary Enclosures - Complete Work Except Delete Floor Plastic.

SELECT EITHER ABOVE OR BELOW.

- 4. 01527 - Regulated Areas

5. 01560 Worker Protection - Asbestos abatement

SELECT EITHER ABOVE OR BELOW.

- 6. 01561 - Worker Protection - Repair & Maintenance
- 7. 01562 Respiratory Protection
- 8. 01563 Decontamination Units

B. Asbestos abatement project requirements to be completed at completion of the work of this section are set forth in the following sections:

- 1. 01711 Project Decontamination

REFER TO SECTION 02085; RESILIENT FLOORING REMOVAL - RESILIENT FLOOR COVERING MANUFACTURERS' RECOMMENDED WORK PRACTICES FOR NON-AGGRESSIVE, PRIMARILY MANUAL, WORK PRACTICES WHICH MAY ALSO BE USED TO REMOVE RESILIENT FLOOR COVERING FOR APPLICABILITY OF THAT SECTION.

1.3 SUBMITTALS:

A. **Before Start of Work:** Submit the following to the Designer for review. Do not start work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use.

REVISE THE FOLLOWING IF ONLY SURFACTANT OR REMOVAL ENCAPSULANT IS GOING TO BE ALLOWED ON THE PROJECT.

- 1. **Wetting Materials:** Submit product data, use instructions and recommendations from manufacturer of wetting material (surfactant and/or removal encapsulant) intended for use. Include data substantiating that material complies with requirements.

SOME REMOVAL ENCAPSULANTS ARE NON-AQUEOUS. THIS LEADS TO A TECHNICAL ISSUE OF WHETHER THESE MATERIALS ARE "WETTING" AS IS REQUIRED BY NESHAP. THE PROJECT DESIGNER SHOULD INVESTIGATE THE PRODUCTS THAT ARE GOING TO BE SPECIFIED TO DETERMINE IF THEY COMPLY WITH NESHAP WETTING REQUIREMENTS. THE FOLLOWING IS LANGUAGE THAT IS APPROPRIATE IF THE SELECTED MANUFACTURER HAS SUCH DOCUMENTATION. IT WILL HELP DETERMINE THE EQUIVALENCY OF ALTERNATIVE "EQUAL" MATERIAL PROPOSED.

- 2. **NESHAP Compliance Documentation:** Submit manufacturer's documentation for removal encapsulants proposed for use that, to the extent required by this specification, the material, if used in accordance with manufacturer's instructions, will comply with the wetting requirements of National Emission Standard for Hazardous Pollutants (NESHAP) Asbestos Regulations (40 CFR 61, Subpart M).

CAUTION SHOULD BE USED IN SPECIFYING THE USE OF SHOT/BEAD BLAST EQUIPMENT WITHOUT WETTING. THIS MAY CONSTITUTE A DRY REMOVAL UNDER EPA NESHAP. THE EPA NESHAP COORDINATOR MUST APPROVE IN WRITING ANY DRY REMOVAL PRIOR TO THE START OF WORK. REFER TO THE NESHAP REGULATION FOR SPECIFIC REQUIREMENTS AND NOTIFICATIONS.

3. NESHAP Compliance Documentation: Submit written approval from the EPA NESHAP Coordinator, in compliance with applicable requirements of National Emission Standard for Hazardous Pollutants (NESHAP) Asbestos Regulations (40 CFR 61, Subpart M), for the use of shot/bead blast equipment for adhesive removal.

DELETE THE FOLLOWING IF DRY ICE IS NOT TO BE USED ON THE PROJECT.

4. Plan of Action for Dry Ice Use: Submit a plan of action as required by this section for protection of workers from carbon dioxide and cold hazards associated with use of dry ice. Testing and protective measures proposed are to be certified by a Certified Industrial Hygienist (CIH) as defined in Section 01097 "Definitions & Standards - Asbestos Abatement".

DELETE THE FOLLOWING IF ADHESIVE REMOVAL SOLVENTS ARE NOT TO BE ALLOWED ON THE PROJECT.

5. Adhesive Removal Solvent: Submit product data, use instructions and recommendations from manufacturer of adhesive removal solvent intended for use. Include data substantiating that material complies with requirements.
- B. Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal has been 'Received - Not Reviewed.'
1. Material Safety Data Sheet: Submit Material Safety Data Sheets, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for all materials proposed for use on the work including:
 - a. Surfactants.
 - b. Adhesive Removal Solvents.

PART 2 - PRODUCTS

THE FOLLOWING ALLOWS THE CONTRACTOR TO USE EITHER A SURFACTANT IN WATER, A REMOVAL ENCAPSULANT, LIQUID DISHWASHING DETERGENT, OR FOAM (VISCIOUS LIQUID). SELECT THE WETTING AGENT MOST APPROPRIATE TO THE PROJECT AND REVISE THE FOLLOWING AS APPROPRIATE.

2.1 MATERIALS

- A. Wetting Materials:** For wetting prior to disturbance of asbestos-containing materials use:
1. Amended Water: Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the asbestos-containing material (ACM) and retardation of fiber release during disturbance of the material equal to or greater than

that provided by the use of one ounce of a surfactant consisting of 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether mixed with five gallons (19 liters) of water.

- 2. Removal Encapsulant: Provide a penetrating-type encapsulant designed specifically for removal of ACM. Use a material which results in wetting of the asbestos-containing material and retardation of fiber release during disturbance of the material equal to or greater than that provided by water amended with a surfactant consisting of one ounce of 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether mixed with five gallons (19 liters) of water.

IN A STUDY DONE UNDER THE AUSPICES OF THE RESILIENT FLOOR COVERING MANUFACTURERS SOME OF THE MOST EFFECTIVE WETTING AGENTS FOR FIBER REDUCTION IN SHEET FLOORING REMOVAL WERE FOUND IN "LIQUID DISHWASHING DETERGENTS" STATED TO CONTAIN "ANIONIC, NONIONIC, AND AMPHOTERIC SURFACTANTS". THE MANUFACTURERS RECOMMEND THAT 16 OZ. (0.5 LITERS) OF DETERGENT BE MIXED WITH ONE GALLON (4 LITERS) OF WARM WATER AND CAUTION THAT RESILIENT FLOORING BECOMES SLIPPERY WHEN WET WITH A DETERGENT SOLUTION.

- 3. Dishwashing detergent that contains anionic, nonionic, and amphoteric surfactants.

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION EXPERIMENTED WITH THE USE OF FOAM TO WET VINYL ASBESTOS TILES DURING REMOVAL. THEY FOUND THIS MATERIAL TO BE AT LEAST AS EFFECTIVE AS AMENDED WATER IN REDUCING AIRBORNE FIBER LEVELS DURING REMOVAL.

FIREFIGHTING FOAM WAS THE MATERIAL USED IN THE TESTS THOUGH OTHER TYPES OF FOAM SHOULD WORK AS WELL.

- B. **Foam or Viscous Liquid:** Provide material that contains no organic materials, is non-flammable, presents no physical hazard due to reactivity, presents no acute or chronic health hazard, and does not require special skills, knowledge, or equipment for application.

THE RESILIENT FLOOR COVERING MANUFACTURERS DO NOT RECOMMEND THE USE OF SOLVENTS, OTHER THAN WATER, FOR ADHESIVE REMOVAL SINCE STAINING CAN OCCUR WHEN NEW FLOORING IS INSTALLED. SEE MANUFACTURER'S RECOMMENDATIONS FOR INSTALLATION OF NEW FLOORING.

DELETE THE FOLLOWING IF SOLVENT IS NOT GOING TO BE USED FOR ADHESIVE REMOVAL.

- C. **Tile Adhesive Removal Solvent:** Provide a slow-drying solvent intended to remove tile adhesive. Provide material that is not flammable, does not create combustible vapors and has no significant inhalation hazard.

INCLUDE THE FOLLOWING AND REVISE AS REQUIRED IF VOLATILE ORGANIC COMPOUNDS (VOC'S) ARE REGULATED IN THE LOCALITY WHERE THE WORK IS TO OCCUR. CHECK WITH THE LOCAL ENVIRONMENTAL PROTECTION OR ENVIRONMENTAL CONTROL AGENCY FOR APPLICABLE REGULATIONS.

IF VOLATILE ORGANIC COMPOUNDS ARE PRESENT ON THE JOB THIS MAY AFFECT RESPIRATORY PROTECTION REQUIREMENTS. THIS SHOULD BE REVIEWED BY A PHYSICIAN WITH A SPECIALTY IN OCCUPATIONAL MEDICINE, A CERTIFIED INDUSTRIAL HYGIENIST OR ANOTHER APPROPRIATE PROFESSIONAL.

1. Provide materials that have less than 250 g/l of volatile organic solvents (VOCs).

D. Polyethylene Sheet: A single polyethylene film in the largest sheet size possible to minimize seams, 6.0 mil (0.15 mm) thick, clear, frosted, or black as indicated.

THE FOLLOWING OFFERS A GOOD PRECAUTION FOR AREAS CONTAINING HOT EQUIPMENT OR POTENTIAL FOR FIRE, SUCH AS BOILER ROOMS. NOTE; FIRE RETARDANT SHEET PLASTIC IS CONSIDERABLY MORE EXPENSIVE THAN STANDARD PLASTIC.

E. Polyethylene Sheet: Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick frosted or black as indicated.

F. Duct Tape: Provide duct tape in 2 inch or 3 inch (50 or 75 mm) widths as indicated, with an adhesive formulated for use on sheet polyethylene.

G. Spray Cement: Provide, in aerosol cans, spray adhesive which is formulated for use on sheet polyethylene. Provide materials that do not contain methylene chloride.

H. Disposal Bags: Provide 6 mil (0.15 mm) thick leak-tight polyethylene bags labeled as required by Section 02084 Disposal of Regulated Asbestos-Containing Material.

I. Fiberboard Drums: Provide heavy duty leak-tight fiberboard drums with tight sealing locking metal tops.

J. Steel Drums: Provide leak-tight steel drums with tight-sealing locking metal tops.

K. Injection Molded Plastic Drums: Provide leak-tight injection-molded plastic drums with tight sealing locking tops.

L. Paper board Boxes: Provide heavy-duty corrugated paperboard boxes coated with plastic or wax to retard deterioration from moisture. Provide in sizes that will easily fit in disposal bags.

M. Polyethylene Boxes: Provide heavy-duty polyethylene boxes. Provide leak-tight boxes or boxes in sizes that will easily fit in disposal bags.

2.2 PRIMARY RESILIENT FLOORING REMOVAL EQUIPMENT

A. Manual Spades:

- 1. Hand operated scraper/chisels with long handles and replaceable blades for removal of resilient flooring.

GENERALLY RETAIN THIS SECTION AS IT IS ALMOST CERTAIN THAT MANUAL SPADES WILL BE USED FOR AT LEAST PART OF THE WORK EVEN IF POWERED EQUIPMENT IS USED FOR THE MAJORITY OF REMOVAL WORK.

- 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

RETAIN ABOVE FOR NONPROPRIETARY OR BELOW FOR SEMI-PROPRIETARY SPECIFICATION. REFER TO DIVISION-1 SECTION " SUBSTITUTIONS."

- 3. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

THE FOLLOWING IS A LIST OF FIRMS BELIEVED TO MANUFACTURE THIS PRODUCT. NO MANUFACTURERS HAVE BEEN INTENTIONALLY EXCLUDED AND NO ATTEMPT HAS BEEN MADE TO EVALUATE THESE PRODUCTS. ADDITIONAL SUPPLIERS MAY EXIST. PRODUCT LITERATURE SHOULD BE USED TO EVALUATE THESE PRODUCTS AND TO VERIFY THAT LISTED PRODUCTS COMPLY WITH THE SPECIFICATIONS AND MEET PROJECT REQUIREMENTS. VERIFY THAT PRODUCTS INDICATED ARE STILL BEING MANUFACTURED. EDIT OR ADD TO THE LIST AS APPROPRIATE TO THE PROJECT REQUIREMENTS

- a. Crain Cutter Co., Inc. Various manual scrapers/strippers
156 So. Milpitas Blvd.
Milpitas, CA 95035
408-946-6100
- b. Beno J. Gundlach Company Various manual scrapers/strippers
P.O. Box 544
Belleville, IL 62222
618-233-1781
- c. Roofing Equipment, Inc. Taylor Tools
11075 East 47th Avenue "Spud Bar" and other manual scrapers/strippers
Denver, CO 80239
303-371-7667
- d. Red Devil, Inc. "The Slam Scraper"
2400 Vauxhall Road
Union, NJ 07083-1933
201-688-6900 or 800-4-A-DEVIL

B. Powered Spades:

- 1. Long-handled scraper/chisels used in a full-standing position that have replaceable blades and are pneumatically or electrically-powered to move in a reciprocating (in and out) motion.
- 2. Provide powered spades that are equipped with pneumatic vents and piston seals that prevent compressed air or blow by from sweeping floor.

DELETE THIS SECTION FOR SMALL PROJECTS WHERE POWERED EQUIPMENT WILL NOT BE USED.

- 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

RETAIN ABOVE FOR NONPROPRIETARY OR BELOW FOR SEMI-PROPRIETARY SPECIFICATION. REFER TO DIVISION-1 SECTION "PRODUCTS AND SUBSTITUTIONS."

- 4. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

THE FOLLOWING IS A LIST OF FIRMS BELIEVED TO MANUFACTURE THIS PRODUCT. NO MANUFACTURERS HAVE BEEN INTENTIONALLY EXCLUDED AND NO ATTEMPT HAS BEEN MADE TO EVALUATE THESE PRODUCTS. ADDITIONAL SUPPLIERS MAY EXIST. PRODUCT LITERATURE SHOULD BE USED TO EVALUATE THESE PRODUCTS AND TO VERIFY THAT LISTED PRODUCTS COMPLY WITH THE SPECIFICATIONS AND MEET PROJECT REQUIREMENTS. VERIFY THAT PRODUCTS INDICATED ARE STILL BEING MANUFACTURED. EDIT OR ADD TO THE LIST AS APPROPRIATE TO THE PROJECT REQUIREMENTS

- a. Aramsco "Air Powered Tile Removal System"
1655 Imperial Way - hose
Thorofare, NJ 08086 - compressor
800-666-6933 - spade, chisel
- b. Equipment Development Co., Inc. "A-LR-5"
100 Thomas Johnson Drive
Frederick, MD 21701
301-663-1600 or 800-638-EDCO

C. Stripper Machines:

- 1. These are walking units with blades at the front, driven by electric motors, and move either in a reciprocating (in and out) or an oscillating orbital motion.

DELETE THIS SECTION IF STRIPPER MACHINES ARE NOT TO BE USED ON THE PROJECT

2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

RETAIN ABOVE FOR NONPROPRIETARY OR BELOW FOR SEMI-PROPRIETARY SPECIFICATION. REFER TO DIVISION-1 SECTION "PRODUCTS AND SUBSTITUTIONS."

3. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

THE FOLLOWING IS A LIST OF FIRMS BELIEVED TO MANUFACTURE THIS PRODUCT. NO MANUFACTURERS HAVE BEEN INTENTIONALLY EXCLUDED AND NO ATTEMPT HAS BEEN MADE TO EVALUATE THESE PRODUCTS. ADDITIONAL SUPPLIERS MAY EXIST. PRODUCT LITERATURE SHOULD BE USED TO EVALUATE THESE PRODUCTS AND TO VERIFY THAT LISTED PRODUCTS COMPLY WITH THE SPECIFICATIONS AND MEET PROJECT REQUIREMENTS. VERIFY THAT PRODUCTS INDICATED ARE STILL BEING MANUFACTURED. EDIT OR ADD TO THE LIST AS APPROPRIATE TO THE PROJECT REQUIREMENTS

- | | | |
|----|---|--|
| a. | Crain Cutter Co., Inc.
156 So. Milpitas Blvd.
Milpitas, CA 95035
408-946-6100 | No. 700 "Bearcat" Stripper
- without blades
- various blades available |
| b. | Beno J. Gundlach Company
P.O. Box 544
Belleville, IL 62222
618-233-1781 | No. 500
No. 525 |
| c. | Inventive Manufacturing
1440 South Seneca
Wichita, KS 67213
316-267-2443 | "The Big Rip-Off" |
| d. | Palmer Distributing & Sales Co.
P.O. Box 6327
Glendale, CA 91225-0327
818-244-7261 or 800-423-2733 | Model 460
Model PG 101
Model PG 102 |
| e. | Roofing Equipment, Inc.
11075 East 47th Avenue
Denver, CO 80239
303-371-7667 | Taylor Tools |

- c. Nelco Mfg. Corp. JJ2000
6215 Aluma Valley Drive EC72
Oklahoma City, OK 73121
405-478-3440

ASBESTOS CONTROL TECHNOLOGY, INC. DISTRIBUTES THE FOLLOWING WITH A HEPA FILTER ON THE DUST COLLECTOR FOR ASBESTOS ABATEMENT WORK UNDER THE NAME "MASTER BLASTER."

- d. Wheelabrator Corporation "Blastrac"
1606 Executive Drive - seven models
La Grange, GA 30240
1-800-544-4144

2.3 THERMAL EQUIPMENT WITH AUTOMATIC CONTROL:

EQUIPMENT UTILIZING CONTROLLED INFRARED RADIANT HEAT TO MAKE THE RESILIENT FLOOR TILES AND ADHESIVE SOFT AND PLIABLE FOR REMOVAL. AFTER REMOVAL THE MASTIC MUST BE DEALT WITH IN THE NORMAL MANNER. THIS EQUIPMENT GENERALLY UTILIZES CONTROLLED INFRARED RADIANT HEAT TO MAKE THE TILE AND MASTIC SOFT AND PLIABLE FOR REMOVAL.

INFRARED HEATERS WITH AUTOMATIC CONTROL AND HIGH PRESSURE WATER JETS ARE USED PRIMARILY FOR TILE REMOVAL, RATHER THAN FOR REMOVAL OF SHEET GOODS.

A. Thermal Equipment with Automatic Control:

- 1. Equipment utilizing controlled infrared radiant heat to make the resilient floor tiles and adhesive soft and pliable for removal.

DELETE THIS SECTION IF THERMAL EQUIPMENT WITH AUTOMATIC CONTROL IS NOT GOING TO BE USED FOR THE PROJECT.

- 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

RETAIN ABOVE FOR NONPROPRIETARY OR BELOW FOR SEMI-PROPRIETARY SPECIFICATION. REFER TO DIVISION-1 SECTION "PRODUCTS AND SUBSTITUTIONS."

- 3. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

THE FOLLOWING IS A LIST OF FIRMS BELIEVED TO MANUFACTURE THIS PRODUCT. NO MANUFACTURERS HAVE BEEN INTENTIONALLY EXCLUDED AND NO ATTEMPT HAS BEEN MADE TO EVALUATE THESE PRODUCTS. ADDITIONAL SUPPLIERS MAY EXIST. PRODUCT LITERATURE SHOULD BE USED TO EVALUATE THESE PRODUCTS AND TO VERIFY THAT LISTED PRODUCTS COMPLY WITH THE SPECIFICATIONS AND MEET PROJECT REQUIREMENTS. VERIFY THAT PRODUCTS INDICATED ARE STILL BEING MANUFACTURED. EDIT OR ADD TO THE LIST AS APPROPRIATE TO THE PROJECT REQUIREMENTS.

- a. Enviromethods, Inc. "Delta T" series
P.O. Box 6151
Wolcott, CT 06716
203-879-5527
- b. UAS Automation Systems, Inc. "ATR" (Automated Tile Removal)
4524 Parkway Commerce Blvd. series
Orlando, FL 32808
407/294-8551 or 800/969-8837

2.4 HIGH PRESSURE WATER JET:

A. High Pressure Water Jet

- 1. Tools using very high pressure water jets to hydraulically lift tiles.

DELETE THIS SECTION IF HIGH PRESSURE WATER JET EQUIPMENT IS NOT GOING TO BE USED FOR THE PROJECT.

- 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

RETAIN ABOVE FOR NONPROPRIETARY OR BELOW FOR SEMI-PROPRIETARY SPECIFICATION. REFER TO DIVISION-1 SECTION "PRODUCTS AND SUBSTITUTIONS."

- 3. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

THE FOLLOWING IS A LIST OF FIRMS BELIEVED TO MANUFACTURE THIS PRODUCT. NO MANUFACTURERS HAVE BEEN INTENTIONALLY EXCLUDED AND NO ATTEMPT HAS BEEN MADE TO EVALUATE THESE PRODUCTS. ADDITIONAL SUPPLIERS MAY EXIST. PRODUCT LITERATURE SHOULD BE USED TO EVALUATE THESE PRODUCTS AND TO VERIFY THAT LISTED PRODUCTS COMPLY WITH THE SPECIFICATIONS AND MEET PROJECT REQUIREMENTS. VERIFY THAT PRODUCTS INDICATED ARE STILL BEING MANUFACTURED. EDIT OR ADD TO THE LIST AS APPROPRIATE TO THE PROJECT REQUIREMENTS.

- a. Flow Systems, Inc. Operating pressures of 35,000 psi (240 Pa)
and up
21440 68th Ave. South 0-5.6 g.p.m. and up
Kent (Seattle), WA 98032

206-872-4900

2.5 OTHER TECHNOLOGIES APPLIED TO THE WORK:

THE FOLLOWING ARE MACHINES THAT ARE IN USE FOR OTHER PURPOSES BUT CAN ALSO BE USED FOR RESILIENT FLOORING REMOVAL. THEY MAY ALREADY BE OWNED BY THE CONTRACTOR OR MORE WIDELY AVAILABLE FOR RENT, IN WHICH CASE THEY MAY BE AN ACCEPTABLE SUBSTITUTE FOR ONE OF THE MORE SPECIALIZED MACHINES INDICATED ABOVE.

A. Rotary Grinders/Surfacers:

- 1. Machine with discs facing flat against the floor that removes hard materials with a grinding action.
- 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

RETAIN ABOVE FOR NONPROPRIETARY OR BELOW FOR SEMI-PROPRIETARY SPECIFICATION. REFER TO DIVISION-1 SECTION "PRODUCTS AND SUBSTITUTIONS."

- 3. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

THE FOLLOWING IS A LIST OF FIRMS BELIEVED TO MANUFACTURE THIS PRODUCT. NO MANUFACTURERS HAVE BEEN INTENTIONALLY EXCLUDED AND NO ATTEMPT HAS BEEN MADE TO EVALUATE THESE PRODUCTS. ADDITIONAL SUPPLIERS MAY EXIST. PRODUCT LITERATURE SHOULD BE USED TO EVALUATE THESE PRODUCTS AND TO VERIFY THAT LISTED PRODUCTS COMPLY WITH THE SPECIFICATIONS AND MEET PROJECT REQUIREMENTS. VERIFY THAT PRODUCTS INDICATED ARE STILL BEING MANUFACTURED. EDIT OR ADD TO THE LIST AS APPROPRIATE TO THE PROJECT REQUIREMENTS.

- a. Allen Engineering Corporation No. 021006 grinders; diamond (wet cut)
P.O. Box 819 with dust extraction kit
Paragould, AR 72451 - gasoline, electric, propane
501-236-7751 or 800-643-0095
- b. Equipment Development Co. Inc. EDCO grinders diamond (wet cut)
100 Thomas Johnson Drive w/HEPA vac connectors
Frederick, MD 21701 models: SEC, 2EC, 2GC, 411
301-663-1600 or 800-638-EDCO

B. Surfacer/Planers/Scarifiers:

- 1. Machine with a series of small cutters freewheeling on axles mounted on a drum so that the cutters contact the floor surface with a flailing action.

- 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

RETAIN ABOVE FOR NONPROPRIETARY OR BELOW FOR SEMI-PROPRIETARY SPECIFICATION. REFER TO DIVISION-1 SECTION "PRODUCTS AND SUBSTITUTIONS."

- 3. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

THE FOLLOWING IS A LIST OF FIRMS BELIEVED TO MANUFACTURE THIS PRODUCT. NO MANUFACTURERS HAVE BEEN INTENTIONALLY EXCLUDED AND NO ATTEMPT HAS BEEN MADE TO EVALUATE THESE PRODUCTS. ADDITIONAL SUPPLIERS MAY EXIST. PRODUCT LITERATURE SHOULD BE USED TO EVALUATE THESE PRODUCTS AND TO VERIFY THAT LISTED PRODUCTS COMPLY WITH THE SPECIFICATIONS AND MEET PROJECT REQUIREMENTS. VERIFY THAT PRODUCTS INDICATED ARE STILL BEING MANUFACTURED. EDIT OR ADD TO THE LIST AS APPROPRIATE TO THE PROJECT REQUIREMENTS.

- | | | |
|----|---|--|
| a. | Allen Engineering Corporation
P.O. Box 819
Paragould, AR 72451
501-236-7751 or 800-643-0095 | "Thunderbird 8" planer w/dust extraction kit
"Multi-Duty Planer" diamond
head grinder with dust extraction kit |
| b. | Aurand
1210 Ellis Street
Cincinnati, Ohio 45223
513-541-7200 | Handheld units (no vac)
and small walking units |
| c. | Bartell Power Products
56 Harvester Avenue
Batavia, NY 14020
716-344-0850 or 800-247-8577 | "Surface Preparation System" - machine and
cutter individually sold
Handheld units (2" path, no vac) models
SP86, SP86E
Walking units (8" path) with dust extractor
models B446, 436, 346 |
| d. | Equipment Development Co. Inc.
100 Thomas Johnson Drive
Frederick, MD 21701
301-663-1600 or 800-638-EDCO | EDCO various Surfacer/Planers
with HEPA vacs
- models CPM 4, 8, CPU 10, 10C, 12 |
| e. | SASE Company
P.O. Box 81003
Seattle, WA 98108
206-762-0744 | VON ARX
various Surfacer/Scarifiers |

PART 3 - EXECUTION

3.1 RESILIENT FLOOR COVERINGS:

A. Pre-requisite activities: Before starting removal of ACM using the procedures of this section complete work of the following sections:

1. 01503 Temporary Facilities - Asbestos Abatement
2. 01513 Temporary Pressure Differential & Air Circulation System
3. 01526 Temporary Enclosures - Complete work except delete floor plastic.

SELECT EITHER ABOVE OR BELOW.

4. 01527 - Regulated Areas
5. 01560 Worker Protection - Asbestos abatement

SELECT EITHER ABOVE OR BELOW.

6. 01561 - Worker Protection - Repair & Maintenance
7. 01562 Respiratory Protection
8. 01563 Decontamination Units

B. Preparation: Prior to beginning the removal of any resilient floor covering complete the following:

1. Remove appliances and furniture from the work area.

RETAIN THE FOLLOWING PARAGRAPH IF LIQUID DISHWASHING DETERGENT IS TO BE USED FOR A WETTING AGENT.

2. Mix a detergent solution (16 ounces (0.5 liters) of liquid dishwashing detergent to 1 gallon (4 liters) of warm water) and pour into a garden sprayer.

C. Seal Floor Penetrations: Before using wet methods to remove resilient flooring, seal openings, and penetrations in the floor to prevent water leakage.

THE FOLLOWING IS GENERALLY GOOD PRACTICE AS PREPARATION FOR WORK OVER AN UNDERFLOOR RACEWAY SYSTEM. THE DOGHOUSES PRESENT A SEVERE TRIPPING HAZARD, CANNOT BE SEALED WELL, AND TRAP SOME RESILIENT FLOORING BENEATH THEM. DELETE THIS PARAGRAPH IF THE WORK DOES NOT INVOLVE AN UNDERFLOOR RACEWAY.

1. Remove surface mounted junction boxes (doghouses) from raceway system.
2. Remove hatch and trench covers that are covered with resilient flooring. Seal opening with plywood. Seal edges of plywood to floor with urethane foam caulk. Remove resilient flooring from cover in a later operation during wet removal of flooring.

3. Seal openings with a wooden or plywood plug. Seal with urethane foam caulk.
4. Remove flooring material in the immediate area of floor penetrations with a hand spade or scraper.
5. Remove adhesive by hand scraping as necessary to permit installation of seals.
6. Remove any adhesive residue from slab where cover on openings and penetrations must seal to floor to accomplish a water tight assembly. Remove this residue by abrasion using dampened, clean, sharp, cutting sand and a hand-held rubbing stone as necessary. Use minimum wetting required to permit removal. Use caution to prevent water leakage into opening or penetration.

THE TWO PARAGRAPHS BELOW CALL FOR THE USE OF STRIPPABLE COATING THAT IS MORE SECURE AGAINST LEAKAGE. DELETE THESE TWO PARAGRAPHS IF SHEET PLASTIC IS TO BE USED FOR THIS PURPOSE.

7. Cover sealed plywood hatch cover assemblies with strippable coating. Install strippable coating so that it seals plywood to floor.
8. Cover sealed openings with strippable coating installed so that it seals opening.

USE THE PARAGRAPH BELOW IF SHEET PLASTIC IS TO BE USED TO SEAL FLOOR COVERS RATHER THAN STRIPPABLE COATING. DELETE IF STRIPPABLE COATING IS TO BE USED.

9. Cover sealed plywood hatch assemblies with 6 mil (0.15 mm) sheet plastic. Seal plastic to floor with spray glue or urethane caulk.

USE THE PARAGRAPH BELOW IF SHEET PLASTIC IS TO BE USED TO SEAL FLOOR OPENINGS RATHER THAN STRIPPABLE COATING. DELETE IF STRIPPABLE COATING IS TO BE USED.

10. Cover sealed openings with sheet plastic. Seal plastic to floor with spray glue or urethane caulk.

REMOVAL OF RESILIENT FLOORING IS A THREE-PART PROCESS.

THE FIRST STEP IS TO REMOVE THE TILES OR SHEET MATERIAL. THIS IS ACCOMPLISHED WITH POWER SPADES OR FLOOR STRIPPERS.

THE SECOND STEP IS TO REMOVE ANY HEAVY BUILT-UP ADHESIVE OR MASTIC, FELT, OR RUBBER BACKING. THIS IS ACCOMPLISHED WITH A ROTARY CUTTER. THIS STEP IS FREQUENTLY UNNECESSARY IN RESILIENT TILE REMOVAL PROJECTS WHERE THE ADHESIVE LAYER IS THIN.

THE FINAL STEP IS THE REMOVAL OF ADHESIVE RESIDUE FROM THE FLOOR. THIS IS ACCOMPLISHED BY USE OF SHOT/BEAD BLAST MACHINES.

- D. Remove Resilient Flooring:** Use the three step process described in the following sections:
1. First Step: "Removal of Resilient Tile Floor Covering," and/or "Removal of Resilient Sheet Flooring." This step involves removal of tiles or the wear layer of sheet flooring using a powered spade or stripper machine.

2. Second Step: "Removal of Heavy Residue of Adhesive" and/or "Removal of Residual Backing." This step involves the use of a rotary cutter to remove the bulk of these residual materials. As an alternative hand scraping can be used for this purpose.
3. Third Step: "Removal of Adhesive Residue." After completion of the first two steps there will be a thin residue of adhesive left on the floor. This is removed using a shot/bead blast machine. If the thickness of adhesive residue is too thick to permit effective use of the shot/bead blast machine, repeat the second and third steps.
4. At the completion of all work, leave the substrate in such a state as to comply with all requirements and recommendations of manufacturer of replacement flooring.

3.2 STEP ONE REMOVAL OF RESILIENT TILE FLOOR COVERING:

A. Remove resilient tile floor covering using the following procedure:

1. General:
 - a. Remove binding strips or other restrictive molding from doorways, walls, etc. clean and dispose of as non-asbestos waste. Dispose of any materials that have glue or floor mastic on them as asbestos-containing waste.
2. Wet Floor:
 - a. Wet floor with amended water, removal encapsulant, or detergent solution, so that entire surface is wet. Do not allow to puddle or run off to other areas. If a removal encapsulant is used, use in strict accordance with manufacturer's instructions. Cover with sheet polyethylene to allow humidity to release tile from floor. Allow time for humidity and water or removal encapsulant to loosen tiles prior to removal.
 - b. Keep floor continuously wet throughout removal operation.
 - c. Remove tiles using a manual or powered spade, or stripping machine. Continuously mist floor in area where machine is working with amended water, removal encapsulant or detergent solution. Wet any debris generated as necessary to keep continuously wet. Keep floor where tile has been removed continuously wet until after completion of heavy adhesive residue removal.

USE THE FOLLOWING AND DELETE ABOVE IF FOAM OR VISCOUS LIQUID IS TO BE USED, OR EDIT TO ALLOW EITHER METHOD AT CONTRACTOR'S OPTION.

3. Foam or Viscous Liquid:
 - a. Distribute dry foam in a uniform manner over floor. Use sufficient powder to form 1 inch (25 mm) of foam. Wet powder to produce foam. Add additional powder and wet as necessary to maintain 1 inch (25 mm) of foam during the entire removal process.
 - b. Remove tiles using a manual or powered spade, or stripping machine. Add additional dry foam powder and wet as necessary to maintain 1 inch (25 mm) of foam during the entire removal process. Maintain layer of foam on floor where tile has been removed until after completion of heavy adhesive residue removal.

B. Debris and Waste

1. Dispose of all friable materials in accordance with Section 02084 Disposal of Regulated Asbestos containing Material . Dispose of Category I non-friable waste in accordance with State and Local Regulations.

SELECT EITHER ABOVE OR BELOW DISPOSAL METHODOLOGY

2. Pick up whole tiles, stack, place in boxes or wrap in felt, and place in labeled disposal bags. At the Contractor's option tiles may be placed directly into durable leak-tight containers.
3. Shovel broken tiles and debris into cardboard boxes that are placed in a disposal bag, or place directly in steel leak-tight drums.
4. Place bagged waste in a second disposal bag during decontamination and dispose of waste as required by Section 02084 Disposal of Regulated Asbestos-Containing Material.

DELETE THE FOLLOWING IF DRY ICE IS NOT TO BE USED ON THE PROJECT.

C. Dry Ice: Place block (approximately 20 pounds (9 kg)) of dry ice on tile to be removed. Allow to remain in place until the bond between the floor and tile is broken. Do not allow dry ice to remain in one location for more than 15 minutes to avoid frost damage to substrate. Relocate dry ice block to next location to be removed. Store dry ice in ice chest when not in use. Require that workers use insulated gloves while handling dry ice. Provide adequate ventilation to prevent a build up of carbon dioxide in the work area. Use exhaust-type ventilation as described in Section 01513 Pressure Differential and Ventilation System. Do not use a recirculation ventilation system. Provide at a minimum one air change per hour for each block of dry ice in use. Use no more than one block of dry ice per 100 square feet (30 sq meters) of work area.

1. Develop a plan of action for preventing a hazard from carbon dioxide and cold. Include in this plan of action: a description of type, location, and frequency of air testing that will be performed to detect in advance workers potentially overexposed to carbon dioxide; stop work and evacuation levels, method of correcting and preventing high carbon dioxide levels; protective equipment and work methods to prevent frost bite and protect workers from cold. Automatically and voluntarily stop work and evacuate the work area if a stop work level is measured, or if requested by the owner's representative on the basis of potentially high carbon dioxide levels. If a stop work has occurred, do not restart work until a method has been developed to control carbon dioxide levels and written authorization has been given by the Designer.

3.3 STEP ONE - REMOVAL OF ADHERED SHEET RESILIENT FLOORING:

A. Use the following procedure to remove adhered resilient sheet flooring completely:

1. Wet Floor
 - a. Wet floor with amended water, removal encapsulant, or detergent solution so that entire surface is wet. Do not allow to puddle or run off to other areas. If a removal encapsulant is used, use in strict accordance with manufacturer's instructions.
 - b. Keep floor continuously wet throughout removal operation.
 - c. Remove wear layer using a manual or powered spade, or stripping machine. Continuously mist floor in area where machine is working with amended water, removal encapsulant or detergent solution. Wet any debris generated as necessary to keep continuously wet. Keep floor where wear layer has been removed continuously wet until after completion of heavy residue removal.

USE THE FOLLOWING AND DELETE ABOVE IF FOAM OR VISCOUS LIQUID IS TO BE USED, OR EDIT TO ALLOW EITHER METHOD AT CONTRACTOR'S OPTION.

2. Foam or Viscous Liquid
 - a. Distribute dry foam in a uniform manner over floor. Use sufficient powder to form 1 inch (25 mm) of foam. Wet powder to produce foam. Add additional powder and wet as necessary to maintain 1 inch (25 mm) of foam during the entire removal process.
 - b. Remove wear layer using a manual or powered spade, or stripping machine. Add additional dry foam powder and wet as necessary to maintain 1 inch (25 mm) of foam during the entire removal process. Maintain layer of foam on floor where the wear layer has been removed until after completion of heavy adhesive residue removal.
3. Debris and Waste:
 - a. Dispose of all friable materials in accordance with Section 02084 Disposal of Regulated Asbestos containing Material. Dispose of Category I non-friable waste in accordance with State and Local Regulations.

SELECT EITHER ABOVE OR BELOW DISPOSAL METHODOLOGY

- b. Shovel broken pieces of wear layer and debris into cardboard boxes that are placed in a disposal bag, or place directly in steel leak-tight drums.
- c. Place bagged waste in a second disposal bag during decontamination and dispose of waste as required by Section 02084 Disposal of Regulated Asbestos-Containing Material.

THE FOLLOWING IS A MANUAL PROCEDURE FOR THE REMOVAL OF RESILIENT SHEET FLOORING. THIS PROCEDURE MAY COINCIDE WITH LOCAL PRACTICE. DELETE IF MANUAL PROCEDURES ARE NOT TO BE USED.

B. Manual Removal:

1. Make a series of parallel cuts, with a knife, 4 to 8 inches (100 to 200 mm) apart parallel to the wall, keeping cut lines wet.

2. Start at the end of the room farthest from the entrance door. This will help avoid tracking of debris from the removal operation. Pry up the corner of the first strip, separating the backing layer. As the strip is being removed, spray a constant mist of the detergent solution into the delamination nip point to minimize any airborne dust particles. When done properly, any felt remaining on the floor and on the back of the strip will be thoroughly wet. Peel the strip either by pulling upward at an angle that permits the best separation or by rolling around a core.
 - a. **PRECAUTION:** Resilient flooring becomes slippery when wet with, amended water, removal encapsulant, or a detergent solution. Use caution to contain the solution in the immediate work area. Stand on a new sheet of plywood or non-slip surface while working on wet surfaces.
3. Debris and Waste:
 - a. Dispose of all friable materials in accordance with Section 02084 Disposal of Regulated Asbestos containing Material. Dispose of Category I non-friable waste in accordance with State and Local Regulations.

SELECT EITHER ABOVE OR BELOW DISPOSAL METHODOLOGY

- b. Roll the strip tightly as it is removed. Tie or tape securely and place in a disposal bag or closed impermeable container for disposal.
4. Occasionally parts of the foam inner-layer will remain stuck to the backing. This condition can sometimes be eliminated by pulling the strips loose from the opposite end. Peel the foam inner-layer from the floor while spraying the detergent solution into the delamination nip point.
5. Some resilient flooring is not readily strippable by hand. When these conditions are encountered, a sharp stiff blade scraper may be used to assist cleavage of the wear layer from felt. If this procedure is used the distance between cuts should be narrowed to 3 to 5 inches (75 to 125 mm) wide.
6. Regardless of whether stripping of the wear surface is accomplished by hand peeling alone or with the assistance of a stiff blade scraper, amended water, removal encapsulant or detergent solution must be sprayed into the delamination nip point to minimize any airborne dust particles.
7. Dispose of all friable materials in accordance with Section 02084 Disposal of Regulated Asbestos containing Material. Dispose of Category I non-friable waste in accordance with State and Local Regulations.

SELECT EITHER ABOVE OR BELOW DISPOSAL METHODOLOGY

8. Place all flooring strips and felt scrapings into disposal bags immediately, while still wet. Close full bags tightly and seal securely for disposal.
9. Keep floor where wear layer has been removed continuously wet until after completion of heavy residue removal.

3.4 STEP TWO - REMOVAL OF HEAVY RESIDUE OF ADHESIVE:

- A.** Remove the heavy residue of adhesive left after removal of resilient tile flooring using the following procedure. If the residual adhesive is sufficiently thin that a shot/bead blast machine or slurry removal can effectively remove the mastic, this step may be skipped and step three started.
 - 1.** Dampen Floor
 - a. Dampen floor by misting with amended water, removal encapsulant, or detergent solution so that entire surface is wet. Do not allow to puddle or run off to other areas. If a removal encapsulant is used, use in strict accordance with manufacturer's instructions.
 - b. Keep floor continuously damp throughout removal operation.

USE THE FOLLOWING AND DELETE ABOVE IF FOAM OR VISCOUS LIQUID IS TO BE USED, OR EDIT TO ALLOW EITHER METHOD AT CONTRACTOR'S OPTION.

- 2.** Foam or Viscous Liquid:
 - a. Add additional foam dry powder and wet as necessary to maintain 1 inch (25 mm) of foam during the entire removal process.
- 3.** Adhesive Removal:
 - a. Begin removal at a point farthest from the entrance to the work area. Work of this step may proceed concurrently with work of removal of tile.
 - b. Remove heavy residue of adhesive backing using a rotary cutting machine. Continuously mist floor in area where machine is working with amended water, removal encapsulant or detergent solution. Wet any debris generated as necessary to keep continuously wet.
- 4.** Disposal and Debris
 - a. Dispose of all friable materials in accordance with Section 02084 Disposal of Regulated Asbestos containing Material . Dispose of Category I non-friable waste in accordance with State and Local Regulations.

SELECT EITHER ABOVE OR BELOW DISPOSAL METHODOLOGY

- b. Pick up scrapings and debris and deposit in a disposal bag or closed impermeable container and dispose of as required by Section 02084 Disposal of Regulated Asbestos-Containing Waste
- 5.** Wet vacuum standing water with HEPA wet/dry vacuum.
- 6.** Mop floor with amended water, removal encapsulant, or liquid detergent solution to remove all debris and residue.
- 7.** Continue the above steps until the adhesive is sufficiently reduced in thickness that it can be effectively removed with shot/bead blast equipment.

THE FOLLOWING IS A HAND-SCRAPING METHOD SIMILAR TO THAT DESCRIBED IN THE SECTION ON "CAREFUL REMOVAL OF RESILIENT FLOORING". THIS METHOD WILL NOT HAVE THE HIGH PRODUCTION RATE OF MACHINE WORK. GENERALLY DELETE THIS SECTION, OR EDIT TO MAKE IT A PROCEDURE USED AT THE CONTRACTORS OPTION.

- 8. Start in the corner of the room farthest from the entrance door and moisten an area of the adhesive approximately 3 by 10 feet (1 m by 3 m) with amended water, removal encapsulant, or detergent solution. Wet scrape with a stiff-bladed wall or floor scraper removing ridges and any loose adhesives until only a thin smooth film remains. Where deposits are heavy or difficult to scrape, heat with a hot-air blower prior to scraping.
 - a. Dispose of all friable materials in accordance with Section 02084 Disposal of Regulated Asbestos Containing Material. Dispose of Category I non-friable waste in accordance with State and Local Regulations.

SELECT EITHER ABOVE OR BELOW DISPOSAL METHODOLOGY

- b. Deposit scrapings in a disposal bag or closed impermeable container and dispose of as required by Section 02084 Disposal of Regulated Asbestos-Containing Material.
- 9. Wet vacuum standing water with HEPA wet/dry vacuum.
- 10. Mop floor with amended water, removal encapsulant, or liquid detergent solution to remove all debris and residue.
- 11. Continue the above steps until the adhesive is sufficiently reduced in thickness that it can be effectively removed with shot/bead blast equipment.

THE FOLLOWING PROCEDURE IS SIMILAR TO THAT ABOVE, BUT IS USED WHERE A FELT OR RUBBER BACKING REMAINS ADHERED TO THE FLOOR AFTER SHEET VINYL FLOORING IS REMOVED. THIS PROCEDURE CAN ALSO BE MODIFIED TO WORK FOR ROOFING FELTS, MASTICS, RUBBER COATING, OR OTHER ELASTOMERIC MATERIALS BONDED TO CONCRETE.

DELETE THE FOLLOWING IF THERE IS NO SHEET VINYL REMOVAL IN THE PROJECT.

3.5 STEP TWO - Removal of Residual Backing Material:

- A. Remove any residual felt or rubber backing remaining adhered to the floor after removal of the wear layer of adhered vinyl sheet flooring by using the following procedure:
 - 1. Wetting:
 - a. Thoroughly wet residual backing with amended water, removal encapsulant, or detergent solution. Wait a few minutes to allow solution to soak into felt.

USE THE FOLLOWING AND DELETE ABOVE IF FOAM OR VISCOUS LIQUID IS TO BE USED, OR EDIT TO ALLOW EITHER METHOD AT CONTRACTOR'S OPTION.

- 2. Foam or Viscous Liquid:
 - a. Add additional foam dry powder and wet as necessary to maintain 1 inch (25 mm) of foam during the entire removal process.

3. Backing Removal:

IF SOME MACHINE OTHER THAN A ROTARY CUTTER IS GOING TO BE USED REVISE THE FOLLOWING AS NECESSARY.

- a. Concrete floors: Use a rotary cutter, a stiff-bladed scraper, or a floor scraper with a replaceable blade to remove the wet backing.
 - 1) Re-wet the backing if the solution has not completely penetrated, if drying occurs or if dry felt is exposed during scraping. Pick up the scrapings as they are removed from the floor and place in a disposal bag or impermeable container.
- b. Wood floor: Wet residual felt as above but do not excessively soak or flood wood floors with detergent solution. Excessive water can damage wood floors to the extent that new underlayment could be required. If this occurs, the Contractor will provide new underlayment at no increase in the Contract Sum. Do not use a rotary cutter on wood floors. Use manual scraping only.

3.6 STEP THREE - REMOVAL OF ADHESIVE RESIDUE:

- A. After removal of resilient flooring and any heavy residue of adhesive, mastic, or backing material, in the previous step, remove all residue of adhesive from the floor using the following procedure:

THE RESILIENT FLOOR COVERING MANUFACTURERS DO NOT RECOMMEND THE USE OF SOLVENTS FOR ADHESIVE REMOVAL SINCE STAINING CAN OCCUR IF SHEET FLOORING IS TO BE REINSTALLED. SEE MANUFACTURERS RECOMMENDATIONS FOR NEW FLOOR COVERING INSTALLATION.

DELETE THE FOLLOWING SENTENCE IF SOLVENTS ARE NOT TO BE USED FOR ADHESIVE REMOVAL.

- 1. Do not use solvents other than water to remove adhesive residue.
- 2. Allow floor to dry after completion of the wet removal procedures used in previous steps.
- 3. Begin removal at a point farthest from the entrance to the work area.
- 4. Remove adhesive residue by either shot/bead blast machine or by slurry removal at the contractor's option.

3.7 SHOT/BEAD BLAST:

CAUTION SHOULD BE USED IN SPECIFYING THE USE OF SHOT/BEAD BLAST EQUIPMENT WITHOUT WETTING. THIS MAY CONSTITUTE A DRY REMOVAL UNDER EPA NESHAP. THE EPA NESHAP COORDINATOR MUST APPROVE IN WRITING ANY DRY REMOVAL PRIOR TO THE START OF WORK. REFER TO THE NESHAP REGULATION FOR SPECIFIC REQUIREMENTS AND NOTIFICATIONS.

- A. Remove residue of adhesive from floor using a shot/bead blast machine with dust collection equipment attached to a HEPA-filtered vacuum cleaner.
- B. If the previous work did not reduce the thickness of adhesive sufficiently to allow effective removal by the shot/bead blast machine, repeat the second step.
- C. Remove residue at walls and other hard to reach locations with a shot/bead blast edging machine or using dampened, clean, sharp, cutting sand and a hand-held rubbing stone.
- D. Continue this operation until there is no residue of adhesive on the floor.
- E. After removal of all residue rinse area with clear clean water using a hand sprayer.
- F. Wet vacuum standing water with HEPA wet/dry vacuum.
- G. Continue with the above steps until the entire room is complete.
- H. Allow floor to dry and vacuum up any remaining dust or dirt using a vacuum equipped with a HEPA filter and metal floor tool (no brush).

3.8 SLURRY REMOVAL:

THE FOLLOWING IS A PROCEDURE USING A TERRAZZO REMOVAL MACHINE THAT IS SIMILAR TO THAT DESCRIBED IN THE SECTION 02085 RESILIENT FLOORING REMOVAL - RESILIENT FLOOR COVERING MANUFACTURERS' RECOMMENDED WORK PRACTICES. THIS METHOD WILL NOT HAVE THE HIGH PRODUCTION RATE OF THE SHOT/BEAD BLAST MACHINE DESCRIBED ABOVE. GENERALLY DELETE THIS SECTION, OR EDIT TO MAKE IT A PROCEDURE USED AT THE CONTRACTOR'S OPTION.

- A. Remove residue of adhesive from floor using slurry removal in a manner that keeps the floor in the area of the work continually wet with a slurry of sand and water.
- B. Place cutting sand (enough to cover an approximate 6 foot by 6 foot (1800 mm x 1800 mm) area) into a container and add either amended water or water mixed with liquid detergent (1 ounce of liquid dishwashing detergent to 1 gallon of water (31.5 ml detergent to 4 liters water)) to dampen the sand (20 pounds (9 kg) of sand to ½ gallon (2 liters) of solution).
- C. Place sand over a 6 foot by 6 foot (1800 mm x 1800 mm) area and wet remove the existing adhesive residue using a terrazzo floor machine. Keep sand under rubbing stones when operating the machine. The sand and subfloor must be continuously kept wet.
- D. Replace cutting sand periodically as needed to maintain adequate cutting and cleaning of floor. Add sand periodically as required.
- E. Occasionally push away cutting sand from the subfloor with a wall or floor scraper to check for complete removal.

- F. Remove adhesive around the edge of the room and missed areas with dampened, clean, sharp, cutting sand and a hand-held rubbing stone.
- G. Wet scrape sand into a pile using a stiff-bladed floor or wall scraper and place sand and adhesive residue in a disposal bag or other impermeable container and dispose of, as required, by Section 02084 Disposal of Regulated Asbestos-Containing Material.
- H. Rinse area with clear, clean water using a hand sprayer.
- I. Wet-vacuum standing water with HEPA wet/dry vacuum.
- J. Continue with the above steps until the entire room is complete.
- K. Allow subfloor to dry and vacuum up any remaining dirt or sand using a vacuum equipped with a HEPA filter and metal floor tool (no brush).

THE FOLLOWING IS A PROCEDURE USING SOLVENTS TO REMOVE ADHESIVE RESIDUE. THE RESILIENT FLOOR COVERING MANUFACTURERS RECOMMEND AGAINST THE USE OF SOLVENTS FOR ADHESIVE REMOVAL. THESE PRODUCTS CAN AFFECT ADHESIVES USED FOR REPLACEMENT FINISHES, OR EVEN THE FINISHES THEMSELVES. THE PROJECT DESIGNER SHOULD CAREFULLY EVALUATE SOLVENTS TO BE USED AND DETERMINE IF THEY WILL BE COMPATIBLE WITH REPLACEMENT MATERIALS.

DELETE THE FOLLOWING PARAGRAPHS IF SOLVENTS ARE NOT GOING TO BE USED FOR ADHESIVE REMOVAL.

3.9 ADHESIVE SOLVENT:

- A. **Adhesive:** Remove adhesive residue by using adhesive removal solvents. Use solvents in accordance with manufacturers' instructions. Saturate adhesive with removal solvent and allow adhesive to soften. Remove by scraping, wet sanding, or wet scrub with floor cleaning machine with abrasive pad. Provide worker protection as required by material safety data sheet (MSDS) for any material used.
 - 1. Mop floor with removal solvent as required by manufacturer's directions as required to completely remove all residue of adhesive.

IT IS NECESSARY TO REMOVE ALL TRACES OF THE REMOVAL SOLVENT TO PREVENT PROBLEMS WITH REPLACEMENT FLOORING. THE TILE ADHESIVE REMOVAL SOLVENT MANUFACTURER MAY HAVE MORE SPECIFIC REQUIREMENTS THAN THE FOLLOWING FOR REMOVING ALL TRACES OF THE SOLVENT PRIOR TO INSTALLATION OF REPLACEMENT FLOORING. REVISE AS NECESSARY.

- 2. Clean Floor after completion of removal of ACM by wet mopping with amended water. Mop three times allowing a drying time between each mopping.

USE PARAGRAPH BELOW IF A LOCK-BACK IS DESIRED AFTER REMOVAL OF AN ASBESTOS-CONTAINING ADHESIVE. EVALUATE ENCAPSULANTS ALLOWED TO AVOID COMPATIBILITY PROBLEMS THAT MIGHT PREVENT BOND OF NEW TILE. THE FOLLOWING IS VERY OPEN LANGUAGE THAT WILL PERMIT EITHER A PENETRATING OR BRIDGING TYPE ENCAPSULANT TO BE USED. REVISE IF A SPECIFIC ENCAPSULANT OR TYPE OF ENCAPSULANT IS REQUIRED TO ENSURE COMPATIBILITY WITH LATER WORK.

3. Encapsulate cleaned floor with one coat of an encapsulant. Use an encapsulant that has been determined not to prevent the bond of new resilient flooring. Follow manufacturer's recommendations for new floor covering installation.
4. Dispose of all rags, plastic sheet, etc. in accordance with requirements of Section 02084 "Disposal of Regulated Asbestos-Containing Material".

- B. Decontaminate Equipment:** After the completion of all work, decontaminate all equipment and machinery used for work of this section. Accomplish decontamination as required by the section on Project Decontamination.

THE PROJECT DESIGNER MUST DECIDE ON THE APPROPRIATE METHOD OF CLEARANCE AIR TESTING. PCM TESTING IS FASTER AND MORE ECONOMICAL BUT WILL MISS SHORT THIN FIBERS THAT PREDOMINATE IN RESILIENT FLOORING REMOVALS. THE FOLLOWING REFERS TO SECTION 01711 FOR CLEARANCE REQUIREMENTS. THIS SECTION SHOULD BE REVISED AS APPROPRIATE FOR REQUIREMENTS OF THIS SECTION.

TEM CLEARANCE SHOULD BE CONSIDERED WHERE MATRIX SUPPORTED (SOLID) TILE IS INVOLVED. THIS MATERIAL PRODUCES A PREPONDERANCE OF SHORT THIN ASBESTOS FIBERS THAT WILL NOT BE DETECTED BY PCM. PROJECTS IN SCHOOLS GREATER THAN SMALL-SCALE, SHORT-DURATION MUST BE CLEARED BY TEM IN ACCORDANCE WITH AHERA.

3.10 WORK AREA CLEARANCE:

- A.** After completion of all resilient flooring and adhesive removal work and prior to removal of critical barriers, decontamination units, and shut down of pressure differential and ventilation system; complete project decontamination and clearance in accordance with section 01711 "Project Decontamination."

END OF SECTION 02087

SECTION 02088 - REMOVAL OF ASBESTOS ROOFING MATERIALS

THERE ARE TWO SECTIONS IN THE OSHA CONSTRUCTION STANDARD (1926.1101) THAT DEAL WITH THE REMOVAL OF ASBESTOS-CONTAINING ROOFING. PARAGRAPH (g)(8) DEALS WITH NON-INTACT ROOFING MATERIALS, OR ROOFING MATERIALS THAT WILL BECOME NON-INTACT DURING REMOVAL. PARAGRAPH (g)(11) DEALS WITH INTACT REMOVAL. THIS SPECIFICATION SECTION IS INTENDED FOR SPECIFYING REMOVAL WORK ON MORE THAN 25 SQUARE FEET OF NON-INTACT BUILT-UP ROOF (BUR) GOVERNED BY PARAGRAPH (g)(8). IF THE PROJECT WILL INVOLVE THE INTACT REMOVAL OF OTHER ROOFING MATERIALS THE DESIGNER SHOULD REFER TO THE INFORMATIONAL DOCUMENT ON ROOFING OPERATIONS PUBLISHED BY OSHA OR THE NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA). THIS DOCUMENT DESCRIBES HOW TO COMPLY WITH THE OSHA ASBESTOS STANDARD IN ROOFING OPERATIONS INVOLVING ASBESTOS-CONTAINING MATERIALS. IT CONTAINS SPECIFIC INFORMATION ON (g)(11) ROOFING WORK.

BEFORE EDITING THIS SECTION CHECK WITH LOCAL REQUIREMENTS FOR DEALING WITH CONTAMINATED MATERIALS. IN SOME LOCALITIES THIS MATERIAL MUST BE HANDLED AS ASBESTOS-CONTAINING.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

1.2 SUMMARY OF WORK:

- A. **Work of this section includes** removal and disposal of all Asbestos-Containing built-up roofing material

1.3 RELATED WORK SPECIFIED ELSEWHERE:

- A. **Asbestos abatement project requirements** to be completed prior to start of the work of this section are set forth in the following sections:
 - 1. **01526** - Temporary Enclosures (for Critical Barriers and Screens)

SELECT EITHER ABOVE OR BELOW.

- 2. **01527** - Regulated Areas
- 3. **01561** - Worker Protection - Repair & Maintenance
- 4. **01562** Respiratory Protection
- 5. **01563** Decontamination Units

1.4 TRAINING

THE FOLLOWING ARE WORKER PROTECTION REQUIREMENTS THAT ARE IN THE OSHA ASBESTOS STANDARD 29 CFR 1926.1101 AND THE COMPLIANCE DIRECTIVE CPL 2-2.63, NOVEMBER 3, 1995.

STATE OR LOCAL REGULATIONS COULD HAVE DIFFERENT OR MORE STRINGENT REQUIREMENTS FOR WORKER AND COMPETENT PERSON TRAINING THAN THE FOLLOWING.

A. Non-Intact Roofing:

1. **Worker Training:** Workers performing removal work on non-intact roofing must have completed an 8-hour training program as required by the OSHA regulation 29 CFR 1926.1101(k) covering asbestos subjects as well as training, including hands-on training, in the work practices and engineering controls specific to roofing removal work and work practices required by 29 CFR 1926.1101(g)(8).
2. **Competent Person:** Engage a person experienced in roofing work who has completed a 40 hr. EPA/AHERA supervisor training course as required by 29 CFR 1926.1101(o)(4)(I).

B. Intact Roofing:

1. **Worker Training:** Workers performing removal work on intact roofing must be trained as required by the OSHA regulation 29 CFR 1926.1101(g)(11) and as set forth in the Compliance Directive CPL 2-2.63 Appendix D page D-22 to D-23.
2. **Competent Person:** Competent Persons for work on intact roofing must be trained as required by the OSHA regulation 29 CFR 1926.1101(g)(11) and as set forth in the Compliance Directive CPL 2-2.63 Appendix D page D-22 to D-23.

DELETE THE FOLLOWING IF NO STATE OR LOCAL REQUIREMENT. REVISE AS REQUIRED TO CORRESPOND WITH APPLICABLE CODE OR REGULATION.

- C. **State and Local Requirements:** All workers are to be trained, certified and accredited as required by state or local regulation.

1.5 SUBMITTALS:

- A. **Before Start of Work:** Submit the following to the Designer for review. Do not start work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use.

DELETE THE FOLLOWING IF SURFACTANTS ARE NOT BEING USED

- 1. **Surfactant:** Submit product data, use instructions and recommendations from manufacturer of surfactant intended for use. Include data substantiating that material complies with requirements.

DELETE THE FOLLOWING IF A DISPOSAL CHUTE IS NOT BEING USED

- 2. **Disposal Chute:** Provide a drawing showing disposal chute and how it is to be mounted and supported. Show the relationship of the chute to the dumpster.

- B. **Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal has been "Received - Not Reviewed."

- 1. **Material Safety Data Sheet:** Submit Material Safety Data Sheets, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for the following:
 - a. Surfactants.
 - b. Encapsulants.
 - c. Solvents.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. **Disposal Chute:** Provide a leak tight waste disposal chute to transfer the materials to the ground.

FOLLOWING IS MOST LIKELY TO BE FOUND ON THE JOB IN THE ABSENCE OF A MORE SPECIFIC REQUIREMENT.

- B. **Polyethylene Sheet:** A single polyethylene film in the largest sheet size possible to minimize seams, 6.0 mil (0.15 mm) thick clear, frosted, or black as indicated.

FOLLOWING IS A GOOD PRECAUTION IN AREAS WHERE THERE IS HOT EQUIPMENT OR A POTENTIAL FOR FIRE, SUCH AS NEAR A CHIMNEY. FIRE RETARDANT SHEET PLASTIC IS CONSIDERABLY MORE EXPENSIVE THAN STANDARD PLASTIC.

- C. **Polyethylene Sheet:** Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil (0.15 mm) thick , frosted or black as indicated.
- D. **Duct Tape:** Provide duct tape in 2 inch or 3 inch (50 or 75 mm) widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
- E. **Spray Cement:** Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.
- F. **Disposal Bags:** Provide 6 mil (0.15 mm) thick leak-tight polyethylene bags labeled as required by Section 02084 Disposal of Regulated Asbestos Containing Material.
- G. **Fiberboard Drums:** Provide heavy duty leak tight fiberboard drums with tight sealing locking metal tops.
- H. **Paper board Boxes:** Provide heavy duty corrugated paper board boxes coated with plastic or wax to retard deterioration from moisture. Provide in sizes that will easily fit in disposal bags.
- I. **Unlabeled Clear Bags:** Provide clear 6 mil (0.15 mm) thick leak-tight polyethylene bags with no label.

PART 3 - EXECUTION

EDIT BELOW AS NECESSARY FOR LOCAL JOB REQUIREMENTS

3.1 GENERAL

IT IS GENERALLY GOOD PRACTICE TO ISOLATE AIR INTAKES FOR VENTILATION EQUIPMENT DURING ROOFING WORK. DUST AND FUMES FROM THE ROOFING WORK CAN CREATE INDOOR AIR QUALITY PROBLEMS. THIS IS PARTICULARLY IMPORTANT WITH HOT TAR ROOFS, BUT THE SOLVENTS AND COATINGS USED WITH SINGLE PLY ROOFS CAN ALSO BE A PROBLEM. OSHA REQUIRES THAT A COMPETENT PERSON DETERMINE THE NEED FOR AND METHOD OF ACCOMPLISHING ISOLATION OF AIR INTAKES TO AVOID DRAWING AIRBORNE ASBESTOS FIBER INTO THE BUILDING'S HEATING AND VENTILATING EQUIPMENT. AIR INTAKE ISOLATION SHOULD BE A PART OF THE PROJECT DESIGN RATHER THAN LEAVING IT TO THE CONTRACTOR.

- A. **Isolate air intakes**

SHUTTING DOWN AND SEALING OFF AIR INTAKES IN THE VICINITY OF ROOFING WORK IS THE BEST WAY TO PROTECT THE BUILDING INTERIOR. UNFORTUNATELY THIS IS NOT ALWAYS POSSIBLE WHERE THE BUILDING IS OCCUPIED AND AIR HANDLING UNITS MUST REMAIN IN OPERATION TO CONDITION AIR. RETAIN THE FOLLOWING IF AIR HANDLING UNITS ARE TO BE SHUT DOWN. DELETE IF AIR HANDLING UNITS MUST REMAIN IN OPERATION.

1. Shut down air handling units that draw in fresh air from any area within 30' of the roofing work.. Seal all air intakes with 6 mil sheet plastic.

FOLLOWING IS A CATCH-ALL THAT SHOULD BE DELETED AND REPLACED WITH A SPECIFICALLY DESIGNED DUCT EXTENSION. IF AIR HANDLING UNITS MUST REMAIN IN OPERATION, THEY MAY NEED TO HAVE TEMPORARY EXTENSIONS ADDED TO EXTEND THEM BEYOND THE WORK AREA. THE DIRECTION OF WIND AND DENSITY OF THE VAPORS AND FUMES, AS WELL AS DUST FROM ROOFING OPERATIONS WILL DETERMINE THE LOCATION OF THE RELOCATED INTAKE. DEPENDING ON THE SIZE AND LENGTH OF THE EXTENSION THIS COULD REQUIRE DESIGN BY A MECHANICAL AND/OR STRUCTURAL ENGINEER. DELETE THE FOLLOWING IF THERE IS TO BE NO INTAKE EXTENSION.

2. Provide horizontal or vertical extension to relocate the opening of air intakes outside or above the regulated area.

A BUFFER ZONE WILL ACCOMPLISH LITTLE ON A HOT TAR PROJECT. ON A SMALL SINGLE-PLY JOB WITH NO COATING A BUFFER ZONE MAY PREVENT VAPORS FROM ENTERING THE BUILDING, IF THE WIND IS BLOWING IN THE RIGHT DIRECTION. A BUFFER ZONE IS ALLOWED BY OSHA AS ONE POSSIBLE MEANS OF ISOLATING AN INTAKE FOR ASBESTOS PURPOSES. DELETE THE FOLLOWING IF THERE IS TO BE NO BUFFER ZONE.

3. Use a 20' buffer zone to isolate the work area from openings into the building.

GENERALLY DELETE THE FOLLOWING. INSTALLING A HEPA FILTER OVER AN AIR INTAKE IS USUALLY NOT FEASIBLE. IT WILL USUALLY THROTTLE DOWN VENTILATION RATES TO UNACCEPTABLE LEVELS AND IS LIKELY TO OVERLOAD AND POTENTIALLY BURN OUT FAN MOTORS. HEPA FILTERS DO NOTHING FOR FUMES FROM HOT TAR OPERATIONS AND SOLVENTS USED IN SINGLE PLY ROOFING. WATER DESTROYS HEPA FILTERS, SO THAT THEY NEED TO BE ENCLOSED SO THAT THEY ARE NOT AFFECTED BY RAIN.

4. Install HEPA filters in fresh air intakes for heating and ventilating equipment

FOLLOWING IS NOT REQUIRED BY OSHA, BUT IS COMMON PRACTICE ON ROOFING PROJECTS. DELETE FOLLOWING IF CRITICAL BARRIERS OVER BUILDING OPENINGS IS NOT DESIRED.

- B. **Install critical barriers** over all openings into building, adjacent buildings, or equipment within 30 feet of the work. Do not cover building surfaces. Erect temporary screens of reinforced sheet plastic as required to prevent wind carrying products of work to any entries of building or occupied portions of the site.
- C. **Do not sand, abrade or grind** roofing materials.
- D. **Use Manual methods** which do not render roofing material “non-intact.” These include the use of spud, spade, flat-blade or slicing tools, such as axes, mattocks, pry bars, spud bars, crow bars, shovels, flat-blade knives, and utility knives, to slice, cut, strip-off, shear-under, or pry up the material.

- E. Remove roofing materials** in an intact state to the extent feasible.
- F. Non-intact Built Up Roofing:** Perform all removal work on non-intact roofing when outside temperatures are warm enough that the bitumen in the roofing is above the phase change (glass) point. Carry out all roofing removal in a manner that will minimize pulverizing, breaking or abrading of involved materials.
1. **Use Wet Methods** to remove roofing materials that are not intact, or will be rendered not intact during removal, unless wet methods are not feasible or will create safety hazards.
 2. **Non-intact Roof Membrane:** Wet surface of roof with amended water. Use sufficient water to completely wet surface but not cause ponding or running of water. Cut roof membrane into sections able to fit in disposal boxes. Use rotary blade to cut roof. Do not saw. Lift sections from insulation and place in disposal boxes. Bag and dispose of as required by Section 02084 "Disposal of Regulated Asbestos-Containing Material."
 3. **Insulation in a non-intact roof assembly:** Wet insulation with amended water sufficiently to enable it to be removed in a crumbly damp mass. Remove by scraping with roofing hoes. Do not use powered roof rippers. Dispose of insulation as a non-asbestos waste.
 4. **Non-intact Vapor Barrier:** Wet surface of vapor barrier with amended water. Use sufficient water to completely wet surface but not cause ponding or running of water. Scrape vapor barrier from roof deck with roofing hoes. Do not use powered roof rippers. Use water based solvent as required to completely remove vapor barrier and as much roofing bitumen as possible from roof deck. Use a HEPA vacuum or wet sweep into sweep shovels to pick up debris. Dispose of as required by Section 02084 "Disposal of Regulated Asbestos-Containing Material."
- G. Power Roof Cutter:** When removing built-up roofs with a power roof cutter
1. **Continuously mist** the blade of the cutting machine during use unless the competent person determines that misting substantially decreases worker safety.
 2. **Collect dust and debris** resulting from the cutting operation:
 - a. **Aggregate Surface:** Collect all dust resulting from the cutting operation with a HEPA dust collector or by HEPA vacuuming along cut line.
 - b. **Smooth Surface:** Collect all dust resulting from the cutting operation with a HEPA dust collector, by HEPA vacuuming along cut line, or by gently sweeping and then carefully and completely wiping up the still-wet dust and debris left along the cut line

- 3. **Immediately bag dust and debris** resulting from the cutting operation or place in covered containers.

- H. **Do not drop or throw** ACM that has been removed from a roof to the ground. Either carry or pass the ACM to the ground by hand, or lower it to the ground via covered, dust-tight chute, crane or hoist.
 - 1. **Intact ACM** remove from the roof as soon as is practical, but in any event no later than the end of the work shift.
 - 2. **ACM that is not intact** lower to the ground as soon as is practical, but in any event no later than at the end of the work shift. While the material remains on the roof either keep it wet, placed in an impermeable waste bag, or wrapped in plastic sheeting.

- I. **Upon being lowered** transfer unwrapped material to a closed receptacle in such manner so as to preclude the dispersion of dust.

3.2 WARNING SIGNS

OSHA REQUIRES THAT WARNING SIGN BE COMPREHENSIBLE TO NON-ENGLISH SPEAKING PEOPLE.

- A. **The warning signs** required by this section shall bear the following information.
 - 1. DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY

WHERE USE OF RESPIRATOR AND PROTECTIVE CLOTHING IS REQUIRED DELETE ABOVE AND USE BELOW.

- 2. DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA

3.3 DISPOSAL

- A. **Dispose** of all friable materials in accordance with Section 02084 Disposal of Regulated Asbestos Containing Material. Dispose of Category I non-friable waste in accordance with State and Local Regulations.

SELECT EITHER ABOVE OR BELOW DISPOSAL METHODOLOGY

- B. Pick up scrapings and debris** and deposit in a disposal bag or closed impermeable container and dispose of as required by Section 02084 “Disposal of Regulated Asbestos-Containing Material.”

3.4 AIRBORNE FIBER LEVELS:

- A. Airborne Fiber Levels:** Maintain airborne fiber levels less than the “Stop Action Levels” set forth in Section 01013 “Summary of Work - Asbestos Abatement.”

END OF SECTION - 02088

SECTION 09251 - GYPSUM BOARD - ASBESTOS ENCLOSURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. **Types of work include** enclosure of Asbestos-Containing Materials (ACM) by the following methods:

ADJUST LISTING BELOW TO PROJECT.

1. Gypsum board including screw-type metal support system
2. Gypsum board directly applied to solid (continuous) substrates
3. Gypsum board applied to wood framing and furring
4. Drywall finishing (joint tape-and-compound treatment)
5. Wood framing and furring are specified in Division 6

1.3 DEFINITIONS:

- A. "Enclosure":
 1. An air-tight, impermeable, permanent barrier around asbestos-containing material to control the release of asbestos fibers into the air.
 2. A space, within which asbestos abatement operations are performed, whose limits are defined by rigid or non-rigid barriers for the purpose of controlling access and limiting fiber escape.

1.4 QUALITY ASSURANCE:

- A. Fire-Resistance Rating:** Where gypsum board systems with fire-resistance ratings are indicated, provide materials and installations which are identical with those of applicable assemblies tested per ASTM E 119 by fire testing laboratories acceptable to authorities having jurisdiction.

DELETE OR REVISE BELOW IF NOT APPLICABLE TO ASSEMBLIES INDICATED. COORDINATE WITH INDICATIONS ON DRAWINGS.

1. Provide fire-resistance rated assemblies identical to those indicated by reference to GA File Nos. in GA "Fire Resistance Design Manual" or to design designations in UL "Fire Resistance Directory" or in test reports of other testing and agencies acceptable to authorities having jurisdiction.

- B. Gypsum Board Terminology Standard:** GA-505 by Gypsum Association.

1.5 SUBMITTALS:

- A. Product Data:** Submit manufacturer's product literature for each gypsum board component, including other data as may be required to show compliance with these specifications.

1.6 DELIVERY, STORAGE AND HANDLING:

- A. Deliver materials** in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials** inside under cover and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.
- C. Handle gypsum boards** to prevent damage to edges, ends or surfaces. Protect metal corner beads and trim from being bent or damaged.

1.7 PROJECT CONDITIONS:

- A. Environmental Requirements, General:** Comply with requirements of referenced gypsum board application standards and recommendations of gypsum board manufacturer, for environmental conditions before, during and after application of gypsum board.
- B. Cold Weather Protection:** When ambient outdoor temperatures are below 50 degrees F (10 degrees C) maintain continuous, uniform, comfortable building working temperatures of not less than 50 degrees F (10 degrees C) for a minimum period of 48 hours prior to, during and following application of gypsum board and joint treatment materials or bonding of adhesives.

- C. Ventilation:** Ventilate building spaces as required to remove water in excess of that required for drying of joint treatment material immediately after its application. Avoid drafts during dry, hot weather to prevent too rapid drying.
 - 1. Use HEPA filtered fan units as described in section 01513 for ventilation if required prior to clearance of work area in accordance with Section 01711.

PART 2 - PRODUCTS

2.1 METAL SUPPORT MATERIALS:

A. Ceiling Support Materials and Systems:

DELETE THIS SUB-ARTICLE IF NO SUSPENSION OR FURRING MEMBERS REQUIRED.

- 1. General: Size ceiling support components to comply with ASTM C 754 unless otherwise indicated.
- 2. Main Runners: Steel channels with rust-inhibitive finish, hot or cold-rolled.

DELETE ABOVE IF CEILING CAN BE DIRECTLY FURRED TO STRUCTURAL MEMBERS (BAR JOISTS, ETC.) OR DIRECT SUSPENSION SYSTEM IS SELECTED.

- 3. Hanger Wire: ASTM A 641, soft, Class 1 galvanized.

USUALLY RETAIN ABOVE WHICH COVERS 8 THROUGH 16 GAGE WIRE. DELETE ABOVE AND RETAIN BELOW WHERE REQUIRED BY LOCAL BUILDING CODE OR BY LOADING.

- 4. Hanger Rods and Flats: Mild steel with zinc or equally rust inhibitive coating for rods and zinc or rust-inhibitive paint finish for flats.
- 5. Hanger Anchorage Devices: Screws, clips, bolts, or other devices applicable to the indicated method of structural anchorage for ceiling hangers and whose suitability for use intended has been proven through standard construction practices or by certified test data. Size devices for 3 x calculated load supported except size direct pull-out concrete inserts for 5 x calculated loads.

DELETE ABOVE ONLY IF HANGERS ARE INDICATED TO BE DIRECTLY TIED TO STRUCTURAL MEMBERS OR CONCRETE REINFORCEMENT.

- 6. Furring Members: ASTM C 645; 0.0179 inch (0.455 mm) min. thickness of base metal, hat-shaped.

- a. Where shown as "Resilient", provide manufacturer's special type designed to reduce sound transmission.

ABOVE HAS A SINGLE OR DOUBLE FLANGE, WHICH MUST BE NAILED/SCREWED TO STRUCTURAL JOIST, ETC. (NOT DIRECTLY TO 25 GAGE STUDS).

- 7. Furring Members: ASTM C 645; 0.0179 inch (0.455 mm) min. thickness of base metal, C-shaped studs.

ABOVE USED FOR SPANS OF MORE THAN FOUR (4) FEET (1200 MM) .

- 8. Furring Anchorages: 16 gage galvanized wire ties, manufacturer's standard wire-type clips, bolts, nails or screws as recommended by furring manufacturer and complying with ASTM C 754.
- 9. Direct Suspension Systems: Manufacturer's standard zinc-coated or painted steel system of furring runners, furring tees, and accessories designed for concealed support of gypsum board ceilings; of proper type for use intended.

CHECK MANUFACTURER'S LITERATURE FOR TYPES AND FINISHES AVAILABLE.

B. Wall/Partition Support Materials:

DELETE THIS SUB-ARTICLE IF NO STEEL STUDS OR FURRING REQUIRED.

- 1. Studs: ASTM C 645; 0.0179 inch (0.455 mm) min. thickness of base metal unless otherwise indicated.

REVISE ABOVE AND BELOW AS DESIRED. COORDINATE WITH CONTRACT DRAWINGS, 1-5/8 INCH (40 MM) OR 2-1/2 INCH (63.5 MM) MAY ALSO BE USED.

- a. Depth of Section: 3-5/8 inch (90 mm), except as otherwise indicated.
- 2. Runners: Match studs; type recommended by stud manufacturer for floor and ceiling support of studs, and for vertical abutment of drywall work at other work.
- 3. Furring Members: ASTM C 645; 0.0179 inch (0.455 mm) min. thickness of base metal, hat-shaped.
 - a. Where shown as "Resilient," provide manufacturer's special type designed to reduce sound transmission.

ABOVE HAS A SINGLE OR DOUBLE FLANGE, WHICH MUST BE NAILED/SCREWED TO STRUCTURAL JOIST, ETC.

4. Fasteners for Furring Members: Type and size recommended by furring manufacturer for substrate and application indicated.

2.2 GYPSUM BOARD PRODUCTS:

THE FOLLOWING ARE TYPICAL MATERIALS AND CHOICES.

- A. **Gypsum Wallboard:** ASTM C 36, of types, edge configuration and thickness indicated below; in maximum lengths available to minimize end-to-end butt joints.

DELETE TYPES BELOW NOT REQUIRED. INDICATE ON DRAWINGS WHERE FOIL-BACKED AND FIRE-RESISTANT TYPES OCCUR.

1. Type: Regular, unless otherwise indicated
2. Type: Foil-backed where indicated
3. Type: Type X for fire-resistant rated assemblies and where indicated
4. Edges: Tapered
5. Edges: Tapered and featured (rounded or beveled) for prefilling

SELECT ONE REQUIREMENT FOR EDGE (ABOVE) AND THICKNESS (BELOW).

6. Thickness: 5/8 inch (16 mm), unless otherwise indicated
7. Thickness: 1/2 inch (13 mm), unless otherwise indicated
8. Thickness: 3/8 inch (10 mm), unless otherwise indicated
9. Thickness: as indicated, or if not otherwise indicated, as required to comply with ASTM C 840 for application system and support spacing indicated

DELETE BELOW IF NO MULTI-LAYER APPLICATIONS.

- B. **Gypsum Backing Board for Multi-Layer Applications:** ASTM C 442 or, where backing board is not available from manufacturer, gypsum wallboard, ASTM C 36, of type, edge configuration and thickness indicated below; in maximum lengths available to minimize end-to-end joints.

DELETE TYPES BELOW NOT REQUIRED. INDICATE ON DRAWINGS WHERE FOIL-BACKED AND TYPE X BOARDS OCCUR.

1. Type: Regular, unless otherwise indicated
2. Type: Foil-backed where indicated
3. Type: Type X for fire-resistance rated assemblies and where indicated
4. Edges: Manufacturer's standard

DELETE ABOVE OR BELOW. BELOW BEST FOR LAMINATED APPLICATION BUT GENERALLY ONLY PRODUCED IN ASTM C 442 MATERIAL. VERIFY AVAILABILITY.

5. Edges: Square, non-tapered; or V-tongue and groove

SELECT ONE THICKNESS REQUIREMENT FROM BELOW.

6. Thickness: 5/8 inch (16 mm), unless otherwise indicated
7. Thickness: 1/2 inch (13 mm), unless otherwise indicated
8. Thickness: 3/8 inch (10 mm), unless otherwise indicated
9. Thickness: As indicated, or if not otherwise indicated, as required to comply with ASTM C 840 for application system and support spacing indicated

PRODUCT BELOW NOT SUITABLE FOR CEILING APPLICATIONS.

- C. **Water-Resistant Gypsum Backing Board:** ASTM C 630, with tapered edges and of type and thickness indicated below; in maximum lengths available to minimize end-to-end butt joints.

RETAIN TYPE OR TYPES BELOW REQUIRED. INDICATE ON DRAWINGS WHERE FIRE-RESISTANT TYPE OCCURS.

1. Type: Regular, unless otherwise indicated
2. Type: Type X for fire-resistant rated assemblies and where indicated
3. Thickness: 5/8 inch (16 mm), unless otherwise indicated
4. Thickness: 1/2 inch (13 mm), unless otherwise indicated
5. Thickness: As indicated, or if not otherwise indicated, 5/8 inch (16 mm)

RETAIN BELOW FOR EXTERIOR SOFFITS INDIRECTLY EXPOSED TO WEATHER. SEE MANUFACTURER'S LITERATURE FOR LIMITATIONS.

- D. Exterior Gypsum Soffit Board:** ASTM C 931, with manufacturer's standard edges, of type and thickness indicated below:

DELETE TYPES BELOW NOT REQUIRED.

1. Type: Regular, unless otherwise indicated
2. Type: Type X for fire-resistance rated assemblies and where indicated

CHECK THE AVAILABILITY OF THICKNESSES OF TYPE X GYPSUM BOARD IN THE PROJECT LOCALITY AND EDIT BELOW TO SUIT PROJECT REQUIREMENTS.

3. Thickness: 5/8 inch (16 mm), unless otherwise indicated
4. Thickness: 1/2 inch (13 mm), unless otherwise indicated

CONSIDER REFERENCING ASTM C 1047-86 FOR ACCESSORIES FOR GYPSUM BOARD. EDIT BELOW ACCORDINGLY.

2.3 TRIM ACCESSORIES:

- A. General:** Provide manufacturer's standard trim accessories of types indicated for drywall work, formed of galvanized steel unless otherwise indicated, with either knurled and perforated or expanded flanges for nailing or stapling, and beaded for concealment of flanges in joint compound. Provide corner beads, L-type edge trim-beads, U-type edge trim-beads, special L-kerf-type edge trim-beads, and one-piece control joint beads.
- B. Semi-Finishing Type:** manufacturer's standard trim units which are not to be finished with joint compound (non-beaded).
- C. Plastic Edge Trim:** manufacturer's standard rigid or semi-rigid PVC moldings of the semi-finished type, shaped to provide resilient contact of gypsum board edges with other work; friction-fit, or pressure-sensitive adhesive mounting.

USUALLY DELETE BELOW (IF EXPOSURE IS SEVERE, GYPSUM BOARD SHOULD NOT BE USED).

2.4 JOINT TREATMENT MATERIALS:

- A. General:** ASTM C 475; type recommended by the manufacturer for the application indicated, except as otherwise indicated.
- B. Joint Tape:** Paper reinforcing tape

EXAMPLES BELOW ARE THE USUAL RANGE OF CHOICES.

- C. **Joint Compound:** Vinyl-type powder for interior use
- D. **Joint Compound:** Ready-mixed vinyl-type for interior use

USUALLY RETAIN ONE OF 2 ABOVE AND ONE OF 2 BELOW; OR THE SUBSEQUENT SELECTION.

- 1. A single multi-purpose type, for entire application
- 2. 2 separate types; one specifically for bedding tapes and filling depressions, and one for topping and sanding
- E. **Joint Compound:** on interior work provide chemical-hardening-type for bedding and filling, ready-mixed vinyl-type or vinyl-type powder type for topping.

2.5 MISCELLANEOUS MATERIALS:

- A. **General:** Provide auxiliary materials for gypsum board work of the type and grade recommended by the manufacturer of the gypsum board.

DELETE MATERIALS BELOW NOT APPLICABLE TO INSTALLATION METHOD SELECTED.

- B. **Laminating Adhesive:** Special adhesive or joint compound specifically recommended for laminating gypsum boards
- C. **Fastening Adhesive (for Wood):** ASTM C 557
- D. **Gypsum Board Screws:** Comply with ASTM C 1002
- E. **Gypsum Board Nails:** Comply with ASTM C 514
- F. **Concealed Acoustical Sealant:** Non-drying, non-hardening, non-skinning, non-staining, non-bleeding, gunnable sealant for concealed applications per ASTM C 919
- G. **Exposed Acoustical Sealant:** Non-oxidizing, skinnable, paintable, gunnable sealant for exposed applications per ASTM C 919
- H. **Sound Attenuation Blankets:** FS HH-I-521, Type I; semi-rigid mineral fiber blanket without membrane, Class 25 flame-spread, thicknesses as indicated
- I. **Ceramic Tile Adhesive:** Type I organic adhesive for ceramic tile complying with ANSI A136.1

PART 3 - EXECUTION

3.1 PREPARATION FOR METAL SUPPORT SYSTEMS

USE FOLLOWING IF WORK INVOLVES ATTACHING SUPPORT SYSTEM FOR CEILING WORK DIRECTLY TO ACM.

A. Ceiling Anchorages: Before starting work of this section complete the following:

1. Section 01513 - Temporary Pressure Differential & Air Circulation System
2. Section 01563 - Decontamination Units
3. Section 01526 - Temporary Enclosures
4. Section 01560 - Worker Protection - Asbestos Abatement
5. Section 01562 - Respiratory Protection

USE FOLLOWING IF WORK INVOLVES ATTACHED SUPPORT SYSTEM FOR CEILING TO "T" BARS OF EXISTING SUSPENDED CEILINGS.

B. Ceiling Anchorages: Before starting of work of this section complete the following:

1. Section 01527 - Regulated Areas
2. Section 01561 - Worker Protection - Repair & Maintenance
3. Section 01562 - Respiratory Protection

USE FOLLOWING IF WORK INVOLVES WALL SYSTEMS ENCLOSING ACM WITH SUPPORT FASTENED TO OR THROUGH ACM.

C. Wall Anchorages: Before starting work of this section complete the following:

1. Section 01513 - Temporary Pressure Differential & Air Circulation System
2. Section 01563 - Decontamination Units
3. Section 01526 - Temporary Enclosures
4. Section 01560 - Worker Protection - Asbestos Abatement
5. Section 01562 - Respiratory Protection

USE FOLLOWING IF WORK INVOLVES WALL SYSTEMS WHICH DO NOT COME IN CONTACT OR ONLY INCIDENTALLY CONTACT ACM.

D. Wall Anchorages: Before starting work of this section complete the following:

1. Section 01527 - Regulated Areas
2. Section 01561 - Worker Protection - Repair & Maintenance
3. Section 01562 - Respiratory Protection

3.2 INSTALLATION OF METAL SUPPORT SYSTEMS:

A. General:

B. ACM: In disturbing ACM comply with the following:

1. Section 01046 - Cutting and Patching Asbestos-Containing Materials
2. Section 01529 - Mini Enclosures and Glovebags

C. Metal Support Installation Standard: Comply with ASTM C 754.

1. Do not bridge building expansion joints with support system. Frame both sides of joints with furring and other support as indicated. Provide air tight seal between partition and adjacent surfaces.
2. Nail or screw furring members to wood framing as indicated.

DELETE ABOVE IF NO WOOD FRAMING (CEILING JOISTS/BEAMS, STUDS, ETC.).

D. Ceiling Support Suspension Systems:

1. Secure hangers to structural support by connecting directly to structure where possible while avoiding contact with ACM; otherwise connect to inserts, clips or other anchorage devices or fasteners as indicated.
2. Space main runners 4 feet (1200 mm) o.c. and space hangers 4 feet (1200 mm) o.c. along runners, except as otherwise shown.

REVISE ABOVE TO COORDINATE WITH STRUCTURE AS DESIRED.

3. Level main runners to a tolerance of 1/4 inch (6 mm) in 12 feet (3600 mm), measured both lengthwise on each runner and transversely between parallel runners.
4. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

FOLLOWING IS THE PREFERRED METHOD OF SUPPORT WHERE POSSIBLE.

E. Direct-hung Metal Support System: Attach perimeter wall track or angle wherever support system meets vertical surfaces. Mechanically join support members to each other and butt-cut to fit into wall track.

1. Space furring member 16 inches (400 mm) o.c., except as otherwise indicated.

TYPICAL INSTALLATIONS OF BELOW SHOULD BE FULLY DETAILED.

2. Install auxiliary framing at termination of drywall work, and at openings for light fixtures and similar work, as required for support of both the drywall construction and other work indicated for support thereon.

F. Wall/Partition Support Systems:

INSTALLATION OF FRAMING FOR BELOW SHOULD BE FULLY DETAILED.

1. Install supplementary framing, blocking and bracing at terminations in the work and for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar work to comply with details indicated or, if not otherwise indicated, to comply with applicable published recommendations of gypsum board manufacturer.
2. Isolate stud system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.
3. Install runner tracks at floors, ceilings and structural walls and columns where gypsum board stud system abuts other work, except as otherwise indicated.
4. Extend partition stud system through acoustical ceilings and elsewhere as indicated to the structural support or substrate above the ceiling.
5. Space studs 16 inches (400 mm) o.c., unless otherwise indicated.

DELETE EITHER ABOVE OR BELOW.

6. Space studs 24 inches (600 mm) o.c., unless otherwise indicated.

DELETE FOLLOWING IF NO DOORS IN THE WORK. LIMITED INFORMATION IS AVAILABLE FROM MANUFACTURERS. ADEQUATE DETAILS SHOULD BE SHOWN ON THE DRAWINGS.

7. Frame door openings to comply with detail indicated or, if not otherwise indicated, to comply with applicable published recommendations of gypsum board manufacturer. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for jack studs) at head and secure to jamb studs.

RETAIN BELOW IF SUSPENSION CEILINGS NOT CAPABLE OF WITHSTANDING DOOR OPENING AND CLOSING FORCES.

8. Extend vertical jamb studs through suspended ceilings and attach to underside of floor or roof structure above, unless otherwise indicated.

9. Frame openings other than door openings to comply with details indicated or, if not indicated, in same manner as required for door openings; install framing below sills of openings to match framing required above door heads.

FURRING CHANNELS ATTACHED TO ACM SHOULD GENERALLY BE AVOIDED IN FAVOR OF "FREE-STANDING" STUD WALL SYSTEMS.

10. Space wall furring members 16 inches (400 mm) o.c., unless otherwise indicated.

DELETE EITHER ABOVE OR BELOW.

11. Space wall furring members 24 inches (600 mm) o.c., unless otherwise indicated.

3.3 GENERAL GYPSUM BOARD INSTALLATION REQUIREMENTS:

A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA 216.

1. Locate exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 1 foot (300 mm) in alternate courses of board.
2. Install ceiling boards in the direction and manner which will minimize the number of end-butt joints, and which will avoid end joints in the central area of each ceiling. Stagger end joints at least 1 foot (300 mm).
3. Install wall/partition boards vertically or horizontally to avoid end-butt joints wherever possible. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs.
4. Install exposed gypsum board with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16 inch (1.6 mm) open space between boards. Do not force into place.
5. Locate either edge or end joints over supports, except in horizontal applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so that like edges abut, tapered edges against tapered edges and mill-cut or field-cut ends against mill-cut or field-cut ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.
6. Attach gypsum board to supplementary framing and blocking; Provide for additional support at openings and cutouts.
7. Form control joints and expansion joints with space between edges of boards, prepared to receive trim accessories. Provide air tight seal.

8. Cover both faces of steel stud partition framing with gypsum board in concealed spaces (above ceilings, etc.), except in chase walls which are properly braced internally.
9. Except where concealed application is required for sound, fire, air or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.75 sq meters) in area, and may be limited to not less than 75 percent of full coverage.
10. Isolate perimeter of non-load-bearing drywall partitions at structural abutments. Provide 1/4 inch to 1/2 inch (6 mm to 13 mm) space and trim edge with J-type semi-finishing edge trim. Provide air tight seal.

BELOW IS FEASIBLE ONLY WITH WOOD FRAMING WHERE FIRE RATINGS ARE NOT REQUIRED. DELETE FOR METAL-FRAMED GYPSUM BOARD.

- B. **Floating Construction:** Where feasible, including where recommended by manufacturer, install gypsum board over wood framing, with "floating" internal corner construction.
- C. **Air-Tight Seal:** Provide air-tight seal at perimeters, control and expansion joints, openings and penetrations with a continuous bead of acoustical sealant including a bead at both faces of partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of beads, and seal flanking paths around or through the work, including sealing of partitions above acoustical ceilings.
 1. Space fasteners in gypsum boards in accordance with referenced standards and manufacturer's recommendations, except as otherwise indicated.

3.4 METHODS OF GYPSUM BOARD APPLICATION:

- A. **Single-layer Application:** Install gypsum wallboard.

DELETE BELOW PROVISION IF NO GYPSUM BOARD CEILINGS.

1. On ceilings; Apply gypsum board prior to wall/partition board application to the greatest extent possible.
2. On partitions/walls: Apply gypsum board either vertically (parallel) or horizontally, unless otherwise indicated, and provide sheet lengths which will minimize end joints. Select method which will eliminate gaps in enclosure that cannot be closed with sealant.
3. Wall Tile Base: Where gypsum board is base for thin-set ceramic tile and similar rigid applied wall finishes, install water resistant gypsum backing board.

4. At showers, tubs and similar "wet" areas, install water-resistant backing boards. Apply with un-cut long edge at bottom of work, and space 1/4 inch (6 mm) above fixture lips. Seal ends, cut-edges and penetrations of each piece with water-resistant adhesive.
5. Acoustical Tile Base: Where gypsum board is base for adhesively-applied acoustical tile, install gypsum backing board.
6. Provide either V-joint type backing board or tape-and-compound treatment of joints (2 coats unsanded).

B. Double-Layer Application: Install gypsum backing board for base layer and exposed gypsum board for face layer.

DELETE BELOW IF NO GYPSUM BOARD CEILINGS.

1. On ceilings: Apply base layer prior to base layer application on walls/partitions; apply face layers in same sequence. Offset joints between layers at least 10 inches (250 mm). Apply base layers at right angles to supports unless otherwise indicated.

REVISE BELOW IF WALL CONDITIONS PERMIT ECONOMICAL USE OF HORIZONTAL APPLICATION OF BASE LAYER AND LAMINATED ATTACHMENT IS METHOD USED.

2. On partition/walls: Apply base layer and face layers vertically (parallel) with joints of base layer over supports and face layer joints offset at least 10 inches (250 mm) with base layer joints.

C. Single-Layer Fastening Methods: Apply gypsum boards to supports as follows:

RETAIN ONE OF THE FOLLOWING. SCREWS SUITABLE FOR METAL OR WOOD OR METAL SUPPORT SYSTEMS.

1. Fasten with screws
2. Fasten to wood supports with adhesive and supplementary screws

D. Double-Layer Fastening Methods: Apply base layer of gypsum board and face layer to base layer as follows:

RETAIN ONE OF THE FOLLOWING.

1. Fasten both base layers and face layers separately to supports with screws.

ABOVE AND BELOW SUITABLE FOR METAL OR WOOD SUPPORTS ABOVE METHOD REQUIRED FOR CERTAIN FIRE-RESISTANCE RATED ASSEMBLIES.

2. Fasten base layers with screws and face layer with adhesive and supplementary fasteners.

3. Fasten base layers to wood supports with nails and face layer with adhesive and supplementary fasteners.

INSERT SPECIFIC REQUIREMENTS (IF KNOWN) FOR THE PARTICULAR SUBSTRATE OF THE SYSTEM.

3.5 INSTALLATION OF DRYWALL TRIM ACCESSORIES:

- A. **General:** Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges in accordance with manufacturer's instructions and recommendations.

THE FOLLOWING ARE ONLY EXAMPLES OF "UNIVERSAL" SCOPE DEFINITIONS FOR THE USE OF TRIM. REVISE AS DESIRED OR SHOW BY DETAILS ON DRAWINGS.

1. Install corner beads at external corners of drywall work.
2. Install edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed, and except where plastic trim is indicated. Provide type with face flange to receive joint compound except where semi-finishing type is indicated. Install L-type trim where work is tightly abutted to other work, and install special kerf-type where other work is kerfed to receive long leg of L-type trim. Install U-type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints).

DELETE BELOW IF NO EXTERIOR BOARD OR JOINTS ARE REQUIRED TO BE FINISHED.

3. Install semi-finishing trim where indicated, and where exterior gypsum board edges are not covered by applied moldings or indicated to receive trim with face flanges covered with joint compound.
4. Install edge trim where indicated on wall panels at juncture with ceilings.
5. Install control joint (beaded-type) where indicated.

3.6 INSTALLATION OF DRYWALL FINISHING:

- A. **General:** Apply treatment at gypsum board joints (both directions), flanges of trim accessories, penetrations, fastener heads, surface defects and elsewhere as required to prepare work for decoration. Prefill open joints and rounded or beveled edges, if any, using type of compound recommended by manufacturer.
 1. Apply joint tape at joints between gypsum boards, except where a trim accessory is indicated.

2. Apply joint compound in 3 coats (not including prefill of openings in base), and sand or sponge between last 2 coats and after last coat.

DELETE BELOW IF NOT DESIRED OR NOT APPLICABLE. V-JOINT BACKING BOARD USUALLY DOES NOT REQUIRE TAPING.

- B. **Base for Acoustical Tile:** Where gypsum board is indicated as a base for adhesively-applied acoustical tile, install tape and 2-coat compound treatment, without sanding.
- C. **Water-Resistant Gypsum Backing Board Base for Ceramic Tile:** Comply with recommendations of gypsum backing board manufacturer for treatment of joints behind ceramic tile.
- D. **Regular Gypsum Board Base for Ceramic Tile:** In areas to be tiled using organic adhesive, tape joints and apply 4 inch (100 mm) wide coat of joint compound.
- E. **Partial Finishing:** Omit third coat (if specified) and sanding on concealed drywall work which is indicated for drywall finishing or which requires finishing to achieve fire-resistance rating, sound rating or to act as air or smoke barrier.
 1. Refer to sections on painting, coatings and wall-coverings in Division-9 for decorative finishes to be applied to drywall work.

3.7 PROTECTION OF WORK:

- A. **Provide final protection** and maintain conditions, in a manner suitable to Installer, which ensures gypsum board work being without damage or deterioration at time of substantial completion.

3.8 CLEANING AND DECONTAMINATION:

- A. **At completion** of all work clean and decontaminate the work area in accordance with Section 01712 - Cleaning and Decontamination Procedures

USE ABOVE IF SECTION 01527 "LOCAL AREA PROTECTION" IS USED. USE BELOW IF SECTION 01526 "TEMPORARY ENCLOSURES" IS USED.

- B. **At completion** of all work clean and decontaminate the Work Area in accordance with Section 01711 - Project Decontamination

END OF SECTION - 09251

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SECTION 09805 - ENCAPSULATION OF ASBESTOS-CONTAINING MATERIALS

THERE ARE TWO DISTINCT METHODS OF SPECIFYING ENCAPSULATION OF ASBESTOS-CONTAINING MATERIALS (ACM).

FIRST, SPECIFY PRODUCTS AND METHODS USED FOR INSTALLATION. IN THIS CASE, THE RESPONSIBILITY FOR DETERMINING WHAT PRODUCT IS APPROPRIATE AND WHAT METHOD OR APPLICATION IS PROPER BELONGS TO THE DESIGN PROFESSIONAL.

SECOND, TREAT THE ENCAPSULANT AS A PROPRIETARY SYSTEM SUPPLIED BY A MANUFACTURER AND INSTALLED BY A CONTRACTOR APPROVED BY THE MANUFACTURER.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. **Drawings and general provisions of Contract**, including General and Supplementary Conditions and Division - 1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. **The Extent of encapsulation work** is shown on the drawings and as herein specified.

THE FOLLOWING ARE EXAMPLES; EDIT AS REQUIRED FOR PROJECT.

1. *The work includes the encapsulating of asbestos-containing fireproofing located above suspended acoustic ceilings.*

FOLLOWING INCLUDES A FICTITIOUS SPACE AND BUILDING NAME. EDIT AS REQUIRED FOR SPECIFIC PROJECT.

2. *The work includes the encapsulating or asbestos-containing spray-on acoustic plaster in the "Main Reading Room" of the Anthophyllite Public Library.*
3. *The work includes the sealing of all scratch coat plaster from which asbestos-containing finish plaster has been removed with two (2) coats of penetrating encapsulant.*
4. *The work includes the sealing of all wood grounds, blocking, etc. that have been in contact with asbestos-containing plaster materials, and cannot be removed for structural or other reasons; with one (1) coat of penetrating encapsulant.*
5. *The work includes the sealing of pipe insulation ends at walls on the perimeter of the work area with two (2) coats of penetrating encapsulant and one (1) coat of bridging encapsulant.*

1.3 RELATED WORK SPECIFIED ELSEWHERE:

- A. Asbestos abatement project requirements** to be completed prior to start of the work of this section are set forth in the following sections:
1. 01503 Temporary Facilities - Asbestos Abatement
 2. 01513 Temporary Pressure Differential & Air Circulation System
 3. 01526 Temporary Enclosures
 4. 01560 Worker Protection - Asbestos abatement
 5. 01562 Respiratory Protection
 6. 01563 Decontamination Units
- B. Asbestos abatement project requirements** to be completed at completion of the work of this section are set forth in the following sections:
1. 01711 Project Decontamination

1.4 DEFINITIONS:

- A. "Encapsulant" :**A material that surrounds or embeds asbestos fibers in an adhesive matrix, to prevent release of fibers.
1. Bridging encapsulant: an encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.
 2. Penetrating encapsulant: an encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.
 3. Removal encapsulant: a penetrating encapsulant specifically designed to minimize fiber release during removal of asbestos-containing materials rather than for in situ encapsulation.
- B. "Encapsulation":** Treatment of asbestos-containing materials, with an encapsulant. Application of a sealer to a substrate following completion of removal of ACM is not considered encapsulation.

1.5 SUBMITTALS:

- A. Product Data:** Submit manufacturer's technical information including label analysis and application instructions for each material proposed for use.
- B. Installation Instructions:** Submit manufacturer's installation instructions with specific project requirements noted.
- C. Performance Warranty:** Submit manufacturer's performance guarantee.
- D. Certification:** Submit written approval of entity installing the encapsulant from encapsulant manufacturer.

- E. **Before Start of Work** submit the following to the Designer for review. Do not begin work until these submittals are returned with the Designer's action stamp indicating that the submittal has been' "Received - Not Reviewed."
 - 1. Material Safety Data Sheet: Submit Material Safety Data Sheets, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for the following:
 - a. Surfactants.
 - b. Encapsulants.

1.6 DELIVERY AND STORAGE:

- A. **Deliver materials to the job site** in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:
 - 1. Name or title of material
 - 2. Manufacturer's stock number and date of manufacture
 - 3. Manufacturer's name
 - 4. Thinning instructions
 - 5. Application instructions

- B. **Deliver materials** together with a copy of the OSHA Material Safety Data Sheet for the material.

1.7 JOB CONDITIONS:

- A. **Apply encapsulating materials** only when environmental conditions in the work area are as required by the manufacturer's instructions.

FOLLOWING SHOULD BE USED IF ENCAPSULATION IS TREATED AS A PROPRIETARY SYSTEM.

1.8 QUALITY ASSURANCE:

- A. **Installation of Spray-On Encapsulation Materials:** Install spray-on materials by a firm and personnel approved by the manufacturer of the primary materials.

THE FOLLOWING HAS BEEN PUBLISHED AS A PROPOSAL IN THE "GRAY PAGES" OF THE ASTM SPECIFICATIONS. THE "GRAY PAGES" CONTAIN MATERIAL WHICH IS BEING PRESENTED FOR COMMENT BUT WHICH HAVE NOT YET BEEN ADOPTED BY ASTM. A COPY OF THIS DOCUMENT SHOULD BE SECURED BEFORE EDITING THIS SECTION.

THE STATUS OF THIS STANDARD SHOULD BE REVIEWED WITH ASTM.

- B. **Testing:** Test material to be encapsulated using methods set forth in ASTM Proposed Specification P-189 "Specification for Encapsulants for Friable Asbestos Containing Building Materials".

A SPECIFIC WARRANTY FORM CAN BE ATTACHED AT END OF SECTION.

IF MANUFACTURER OF ENCAPSULANT GUARANTEES MAXIMUM AIRBORNE FIBER LEVEL, REVISE FOLLOWING PARAGRAPH TO IDENTIFY REQUIRED FIBER LEVEL AND LENGTH OF TIME IT IS TO BE MAINTAINED.

- C. **Performance Warranty:** Submit written Performance Warranty, executed by the manufacturer and co-signed by the contractor, agreeing to repair/replace spray-on work which has cracked, fallen from substrate, or otherwise deteriorated to a condition where it would not perform effectively for its intended purposes due substantially to defective materials or workmanship and not due to abuse by occupants, improper maintenance, unforeseeable ambient exposures or other causes beyond anticipated conditions and manufacturer's /contractor's control.

EDIT BELOW TO SET FORTH A WARRANTY PERIOD APPROPRIATE TO SPECIFIC PROJECT CIRCUMSTANCES.

- 1. Warranty period is ___ years after date of substantial completion.

- D. **Mock-up:** Prior to commencement of work, provide a sample area of encapsulation for approval, 10 feet by 10 feet (3 m by 3 m) in size. The approved mock-up shall serve as a standard for the balance of the encapsulation work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. **Encapsulants:** Provide penetrating or bridging type encapsulants specifically designed for application to ACM.

FOLLOWING CALLS FOR USE OF ONLY FIELD TEST PORTIONS OF THE ASTM PROPOSED SPECIFICATION P-189. BEFORE INCLUDING, DETERMINE IF THE INVOLVED MANUFACTURERS HAVE TESTED THEIR MATERIAL USING THIS PROPOSED SPECIFICATION. IF THEY HAVE, REVISE THE FOLLOWING TO ALSO INCLUDE THE LABORATORY TEST PORTIONS OF THE DRAFT STANDARD.

THE STATUS OF THIS STANDARD SHOULD BE REVIEWED WITH ASTM.

- 1. Draft Standards: Product shall be rated as acceptable for use intended when field tested in accordance with ASTM Proposed Specification P-189 "Specification for Encapsulants for Friable Asbestos Containing Building Materials".
- 2. Fire Safety: Use only materials that have a flame spread index of less than 25, when dry, when tested in accordance with ASTM E-84.

2.2 MANUFACTURERS:

- A. Available Manufacturers:** Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

RETAIN ABOVE FOR NON-PROPRIETARY OR BELOW FOR SEMI-PROPRIETARY SPECIFICATION.

- B. Manufacturer:** Subject to compliance with requirements, provide products of one of the following:

RETAIN ENCAPSULANT TYPES REQUIRED AND DELETE OTHERS. UNDER EACH TYPE RETAINED, RETAIN OR INSERT ONLY THOSE MANUFACTURERS OFFERING PRODUCTS COMPLYING WITH SPECIFIC PROJECT REQUIREMENTS.

- 1. Penetrating Encapsulants:**

SELECT APPROPRIATE ENCAPSULANTS FROM THOSE RATED AS "ACCEPTABLE" WHEN TESTED UNDER THE PROCEDURES OF: "BATTELLE COLUMBUS LABORATORIES' TESTS FOR THE EVALUATION OF ENCAPSULANTS FOR FRIABLE ASBESTOS-CONTAINING MATERIALS." AN UPDATED LIST IS MAINTAINED BY THE EPA.

- 2. Bridging Encapsulants:**

SELECT APPROPRIATE ENCAPSULANTS FROM THOSE RATED AS "ACCEPTABLE" WHEN TESTED UNDER THE PROCEDURES OF: "BATTELLE COLUMBUS LABORATORIES' TESTS FOR THE EVALUATION OF ENCAPSULANTS FOR FRIABLE ASBESTOS-CONTAINING MATERIALS." AN UPDATED LIST IS MAINTAINED BY THE EPA.

PART 3 - EXECUTION

3.1 GENERAL:

- A. Prior to applying any encapsulating material,** ensure that application of the sealer will not cause the base material to fail and allow the sealed material to fall of its own weight or separate from the substrate. Should Contractor doubt the ability of the installation to support the sealant, request direction from the Designer before proceeding with the encapsulating work.
- B. Do Not Commence Application** of encapsulating materials until all removal work within the work area has been completed.

3.2 WORKER PROTECTION:

- A. **Before beginning work** with any material for which a Material Safety Data Sheet has been submitted provide workers with the required protective equipment. Require that appropriate protective equipment be used at all times.
- B. **In addition** to protective breathing equipment required by OSHA requirements or by this specification, use painting pre-filters on respirators to protect the dust filters when organic solvent based encapsulant are in use.

THE FOLLOWING IS AN EXAMPLE OF PROCEDURES THAT CAN BE SPECIFIED FOR "LOCK-BACK" ON REMOVAL PROJECTS. EDIT ACCORDING TO PROJECT REQUIREMENTS.

3.3 SCRATCH COAT PLASTER:

SOME ENCAPSULANTS ARE A ONE COAT SYSTEM. REVISE FOLLOWING AS NECESSARY TO CORRESPOND TO MATERIAL SPECIFIED. IF A CLEAR COLORLESS ENCAPSULANT, PARTICULARLY A PENETRANT, IS USED IT CAN BE DIFFICULT TO GAUGE THE UNIFORMITY OF THE COATING. IN THIS CASE THE USE OF TWO COATS IS PRUDENT REGARDLESS OF PRODUCT USED.

- A. **Apply two (2) coats of encapsulant** to the scratch coat plaster after all ACM has been removed. Apply in strict accordance with the manufacturer's printed instructions for use of the encapsulant as an asbestos coating. Any deviations from such printed instructions must be approved by the Designer in writing prior to commencing work.
 1. Apply encapsulant with an airless spray gun with air pressure and nozzle orifice as recommended by the encapsulant manufacturer.
 2. Apply the first coat encapsulant while the scratch coat is still damp from the asbestos removal procedures. If the surface has been permitted to dry, vacuum surface with a HEPA filtered vacuum cleaner prior to spraying with the encapsulant.
 3. Apply second coat over first coat in strict conformance with manufacturer's instructions.

THE FOLLOWING MAY NOT APPLY TO THE PRODUCTS SELECTED. DELETE IF NOT APPROPRIATE TO PRODUCT SELECTED. IF WALLS AND FLOOR ARE NOT TO BE REFINISHED AFTER COMPLETION OF ABATEMENT WORK THE USE OF A COLORED ENCAPSULANT WILL PROBABLY RESULT IN DAMAGED FINISHES. IF EXISTING FINISHES ARE TO REMAIN AT COMPLETION OF THE WORK IT IS PRUDENT TO DELETE THE FOLLOWING AND USE A CLEAR, COLORLESS PRODUCT.

- 4. **Color the encapsulant contrasting colors** in alternate coats so that visual confirmation of complete and uniform coverage of each coat is possible. Adhere to manufacturer's instructions for coloring. At the completion of work the encapsulated surface must be a uniform third color produced by the mixture.

3.4 SEALING EXPOSED EDGES:

SOME ENCAPSULANTS ARE ONE COAT SYSTEMS. REVISE THE FOLLOWING AS NECESSARY . EVEN IF A ONE COAT SYSTEM IS USED TWO COATS WILL HELP TO INSURE COMPLETE COVERAGE IN WHAT MAY BE A LOCATION THAT IS DIFFICULT TO REACH OR INSPECT.

- A. **Seal edges of ACM** exposed by removals up to an inaccessible spot such as a sleeve, wall penetration, etc. with two (2) coats of encapsulant.
 - 1. Prior to sealing, permit the exposed edges to dry completely to permit penetration of the sealer.

THE FOLLOWING MAY NOT APPLY TO THE PRODUCTS SELECTED. DELETE IF NOT APPROPRIATE TO PRODUCT SELECTED. IF WALLS AND FLOOR ARE NOT TO BE REFINISHED AFTER COMPLETION OF ABATEMENT WORK THE USE OF A COLORED ENCAPSULANT WILL PROBABLY RESULT IN DAMAGED FINISHES. IF EXISTING FINISHES ARE TO REMAIN AT COMPLETION OF THE WORK IT IS PRUDENT TO DELETE THE FOLLOWING AND USE A CLEAR, COLORLESS PRODUCT.

- 2. Color the encapsulant contrasting colors in alternate coats so that visual confirmation of complete and uniform coverage of each coat is possible. Adhere to manufacturer's instructions for coloring. At the completion of work the encapsulated surface must be a uniform third color produced by the mixture.

3.5 ARCHITECTURAL FINISH AND FIREPROOFING:

FOLLOWING TREATS ENCAPSULATION AS A PROPRIETARY SYSTEM.

- A. **Examine Existing Conditions:** Determine if the friable ACM to be encapsulated remains sufficiently bonded to receive the encapsulation process and if encapsulation process will effectively prevent release of asbestos fibers from the material. If the existing ACM is loose and deteriorated, the Contractor must immediately notify the Designer that removal of friable ACM must be accomplished before encapsulation.

WHERE ENCAPSULANTS ARE SPRAYED ONTO OR INTO FIREPROOFING MATERIALS, THE DESIGNER NEEDS TO BE CAREFUL TO SPECIFY THAT THE ENCAPSULANT MUST HAVE A UL CLASSIFICATION FOR THE SPECIFIC APPLICATION. UNDERWRITERS LABORATORIES SUBJECTS ENCAPSULANTS TO E-119 BURN TESTS TO VALIDATE THEIR EFFICACY FOR SUCH APPLICATIONS AND LISTS THEM IN THEIR UL FIRE RESISTANCE DIRECTORY. APPLICATION OF A NON-LISTED ENCAPSULANT WOULD NULLIFY THE FIREPROOFING SYSTEM'S RATING AND RESULT IN AN UNCLASSIFIED SYSTEM THAT MAY NOT MEET LOCAL BUILDING CODE OR OFFICE OF FIRE MARSHALL REQUIREMENTS.

- B. **Encapsulants used on fireproofing materials** must have an Underwriters Laboratories classification and be listed in the current edition of the UL Fire Resistance Directory.
- C. **Before start of work** on an architectural finish complete the work of the following:
 - 1. Section 01560 Worker Protection - Asbestos Abatement
 - 2. Section 01562 Respiratory Protection
 - 3. Section 01526 Temporary Enclosures
 - 4. Section 01563 Decontamination Units

- D. Comply with all manufacturer's instructions** for particular conditions of installation in each case. Consult with manufacturer's technical representative for conditions not covered.
- E. Encapsulate all surfaces** in full compliance with manufacturer's procedures.
- F. At completion of Encapsulation** and before removal of Work Area enclosures and Pressure Differential System, decontaminate space in accordance with requirements of section 01711.
- G. At completion of work** submit manufacturer's record of inspection of completed work and Manufacturer's Performance Guarantee executed by both manufacturer and Contractor.

3.6 DRYING ENCAPSULATED SURFACES

- A. General:** Following encapsulation work allow the HEPA filtered fan units to operate for a sufficient length of time that all encapsulated surfaces dry thoroughly. Use oscillating fans as necessary to assure circulation of air in all parts of the work area during this period. During period of drying operate Temporary Pressure Differential & Air Circulation System as and Exhaust System to as great an extent as possible.
- B. For encapsulation projects** do not start the work of Section 01711 "Project Decontamination" until all encapsulated surfaces are completely dry.

END OF SECTION - 09805

SECTION 15254 - REPAIR OF INSULATION AND LAGGING

GENERAL COMMENTS

This section describes repair of insulation on pipes and other equipment using procedures that involve primarily bridging encapsulants and fabric reinforcing. This section is intended to be used with several other sections to write specifications for O&M work that is going to be hired out to an asbestos abatement contractor rather than being performed by facility maintenance staff. O&M programs are frequently structured so that work that can be accomplished while avoiding ACM is carried out by facility staff, and work that actually disturbs ACM is contracted out. NIBS publishes a manual on the design of asbestos O&M programs and work practices: *GUIDANCE MANUAL, Asbestos Operations & Maintenance Work Practices*. Refer to the NIBS O&M Manual, the introduction, and the evaluation for section 02083 for more discussion on the design of asbestos O&M programs.

- **01527 Regulated Areas:** This section provides the language for specifying the set up of a regulated area, as required by OSHA, in the area in which operations and maintenance work is to take place.
- **01528 Entry Into Controlled Areas:** Requirements for O&M activities such as entry into a space above a suspended ceiling where there is an asbestos-containing fireproofing are set forth in this section.
- **01561 Worker Protection - Repair and Maintenance:** describes the training, equipment and procedures necessary to protect workers against asbestos contamination and other work place hazards during maintenance activities. Respiratory protection is covered in section 01562.
- **01562 Respiratory Protection:** Establishes procedures and equipment for adequate protection against inhalation of airborne asbestos fibers.

The following sections are also intended to be

used in securing contractor services in support of an operations and maintenance program. The specifications of the contracted portion of a typical asbestos O&M program will probably include most or all of the following sections. These sections need to be combined with the administrative specification sections and the other parts of the contract. Refer to the introduction for more information on the administrative specification sections and the necessary parts necessary for a complete set of Contract Documents.

- **01046 Cutting and Patching - Asbestos-Containing Materials:** This section describes procedures to be used if asbestos-containing materials must be cut and patched.
- **01529 Mini-enclosures and Glovebags:** Control procedures for maintenance activities that involve the disturbance of small areas of asbestos-containing materials, but for which there is no negative exposure assessment, or that involve drilling, cutting, abrading, sanding, chipping, breaking or sawing of TSI or surfacing material are set forth in this section.
- **01712 Cleaning and Decontamination Procedures:** Sets forth procedures to clean up asbestos debris and dust, and procedures to decontaminate objects and rooms.
- **02083 Disturbance of ACM During O&M Work:** This section is used to specify the O&M work activities for which there is a negative exposure assessment, and the work is performed in the open. Work of this section is performed in a regulated area.
- **02084 Disposal of Asbestos-Containing Waste Material:** The requirements for the proper containing, transport and disposal of

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asbestos waste are set forth in this section.

If this section is used as part of an asbestos abatement specification, it is possible that work could be performed in an asbestos abatement work area. If this is the case the following specification sections are also needed.

- **01560 Worker Protection - Asbestos Abatement:** describes the training, equipment

and procedures necessary to protect workers against asbestos contamination and other work place hazards during abatement activities. Respiratory protection is covered in section 01562.

- **01563 Decontamination Units:** Explains the setup and operation of the personnel and material decontaminations units.

SECTION 15254 - REPAIR OF INSULATION AND LAGGING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 DESCRIPTION OF WORK:

- A. Repair of insulation** on all piping upon which asbestos-containing insulation is to remain.
- B. Repair of lagging** on boilers, breeching and equipment upon which asbestos-containing lagging and/or insulation is to remain.
- C. Extent of pipe insulation** and lagging to be repaired is shown on the drawings.
- D. Labeling** of repaired Asbestos-Containing Materials (ACM).

1.3 SUBMITTALS

- A. Before the Start of Work:** Submit the following to the Designer for review. Do not begin work until these submittals are returned with Designer's action stamp indicating that the submittal is returned for unrestricted use or final-but-restricted use.
 - 1. Mineral Wool Insulating Cement:** Provide product data.
 - 2. Waterproof Cement:** Provide product data.
 - 3. Nonwoven Fibrous Glass Mat:** Provide product data.
 - 4. Open Weave Glass Fiber Mat:** Provide product data.
 - 5. Plastic Jackets:** Provide product data.
 - 6. Labels:** Submit samples.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Mineral Wool Insulating Cement:** Provide job-mixed insulating plaster manufactured for use on plumbing equipment.
- B. Waterproof Cement:** Provide premixed or job mixed cement manufactured for coating of thermal insulation lagging.
- C. Nonwoven Fibrous Glass Mat:** Provide felt approximately 3/32 inch (2.4 mm) thick fabricated from glass fibers.
- D. Open Weave Glass Fiber Mat:** Provide cloth with approximately 1/4 inch (6 mm) openings in weave, fabricated from glass fibers twisted or braided into strands approximately 1/128 inch (0.198 mm) in diameter.

REVISE BELOW IF SECTION 09805 IS NOT GOING TO BE INCLUDED IN THE SPECIFICATION.

- E. Bridging Type Encapsulant:** as specified in section 09805.
- F. Plastic Jackets:**
 - 1. Available Manufacturers:** Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

RETAIN ABOVE FOR NON-PROPRIETARY OR BELOW FOR SEMI-PROPRIETARY SPECIFICATION. REFER TO SECTION 01632 PRODUCT SUBSTITUTIONS - ASBESTOS ABATEMENT.

- 2. Manufacturer:** Subject to compliance with requirements, provide products of one of the Following:

THE FOLLOWING IS A LIST OF FIRMS BELIEVED TO MANUFACTURE THIS PRODUCT. NO MANUFACTURERS HAVE BEEN EXCLUDED AND NO ATTEMPT HAS BEEN MADE TO EVALUATE THESE PRODUCTS. ADDITIONAL SUPPLIERS MAY EXIST. PRODUCT LITERATURE SHOULD BE USE TO EVALUATE THESE PRODUCTS AND TO VERIFY THAT LISTED PRODUCTS COMPLY WITH THE SPECIFICATIONS AND MEET PROJECT REQUIREMENTS. VERIFY THAT PRODUCTS INDICATED ARE STILL BEING MANUFACTURED. EDIT OR ADD TO THE LIST AS APPROPRIATE TO THE PROJECT REQUIREMENTS

- a. H. B. Fuller Company Speedline 25/50
 6107 Industrial Way Smoke-Safe PVC
 Houston, Texas 77011
 (800)231-9541

PART 3 - EXECUTION

3.1 GENERAL:

A. **Before starting work** of this section complete the following:

1. Section 01513 - Temporary Pressure Differential & Air Circulation System
2. Section 01563 - Decontamination Units
3. Section 01526 - Temporary Enclosures
4. Section 01560 - Worker Protection - Asbestos Abatement
5. Section 01562 - Respiratory Protection

SELECT EITHER ABOVE OR BELOW. SELECT ABOVE FOR CLASS I AND II ASBESTOS WORK. SELECT BELOW FOR CLASS III AND CLASS IV ASBESTOS WORK.

6. Section 01527 - Regulated Areas

ADD THE SECTIONS BELOW FOR CLASS III ASBESTOS WORK

7. Section 01529 - Mini Enclosures and Glovebags
8. Section 01561 - Worker Protection - Repair & Maintenance
9. Section 01562 - Respiratory Protection

CHOOSE ONE OF THE TWO REPAIR METHODS BELOW

B. **Piping:** Remove any loose material with HEPA vacuum. No existing jacket material is to be removed.

C. **Reinforced Bridging Encapsulant:** Repair with reinforced bridging encapsulant:

1. Fill holes with mineral wool insulating cement and cover damaged areas with nonwoven fibrous glass mat completely saturated with bridging type encapsulant.
2. Wrap open joints with nonwoven fibrous glass mat embedded in bridging type encapsulant.
3. Smooth mat to a wrinkle free condition. Allow to dry and coat entire surface of mat with an additional coat of bridging type encapsulant and brush to a smooth uniform appearance.

BRIDGING TYPE ENCAPSULANT INSTALLED AS ABOVE PROVIDES A DURABLE FLEXIBLE COVERING THAT BONDS WELL TO BOTH METAL SURFACES AND INSULATING MATERIALS. NORMAL PIPE WRAPPING MATERIALS SUCH AS CANVAS AND WATERPROOF CEMENT DO NOT BOND WELL TO METAL SURFACES AND FREQUENTLY CRACK DUE TO EXPANSION AND CONTRACTION OF PIPING.

- D. Plastic Jackets:** Repair by covering with plastic jackets.
1. Install in strict accordance with manufacturers instructions
- E. Fittings:** Remove any loose material with HEPA vacuum. No existing jacket material is to be removed.

CHOOSE ONE OF THE TWO REPAIR METHODS BELOW

- F. Reinforced Bridging Encapsulant:** Repair with reinforced bridging encapsulant:
1. Patch damaged fittings as required, using mineral wool insulating cement. Smooth insulation to a uniform appearance, continuous with and not overlapping adjacent straight insulation runs.
 2. Cover entire surface of fitting with nonwoven fibrous glass mat embedded in bridging type encapsulant. Stretch to conform to shape of fitting and smooth to a uniform appearance without wrinkles.
 3. Overlap jackets of adjacent straight insulation sections by 3 inches (75 mm).
 4. Allow to dry and coat entire surface of mat with bridging type encapsulant and brush to a smooth finished appearance.
- G. Plastic Jackets:** Repair by covering with plastic jackets.
1. Install in strict accordance with manufacturers instructions.
 2. Fill holes and gaps in insulation with fibrous glass insulation prior to installing jacket.
- H. Equipment Lagging:** (hot water tanks, converters, etc.) Fill damaged portion of lagging as required with mineral wool insulating cement and cover with nonwoven fibrous glass mat completely embedded in bridging type encapsulant. Coat area of repair and six inches on all sides with bridging type encapsulant, brush out to a uniform appearance. Completely coat lagging which do not possess a canvas jacket with two coats of bridging type encapsulant.
- I. Boiler and Smoke Hoods Breeching Lagging:** Fill damaged portions of lagging, as required, with mineral wool insulating cement. Coat entire surface of lagging with 1/4" (6 mm) minimum thickness of mineral wool insulating cement reinforced with open weave glass fiber mat. Trowel surface smooth finish.

REFER TO 29 CFR 1926 OR SUBSEQUENT REVISIONS OR PROGRAM DIRECTIVES FOR INFORMATION ON OSHA REQUIREMENTS FOR LABELING.

- J. Labeling:** Label all asbestos-containing piping insulation, fitting insulation lagging, etc. in unoccupied areas with a 3 inch x 5 inch (75 mm x 125 mm) stickers containing the words

FOLLOWING IS THE LABEL REQUIRED BY OSHA

1. **DANGER**
CONTAINS ASBESTOS FIBERS
AVOID BREATHING DUST
CANCER AND LUNG DISEASE HAZARD
AVOID BREATHING ASBESTOS

FOLLOWING IS THE LABEL REQUIRED BY THE AHERA REGULATION IN ROUTINE MAINTENANCE AREAS.

2. **CAUTION**
ASBESTOS HAZARD
DO NOT DISTURB WITHOUT PROPER TRAINING AND EQUIPMENT

- K. Alternate labels.** Apply labels minimum 2 per side or maximum of five feet (5') (1500 mm) apart on boilers, breeching and equipment and a minimum of one per section and a maximum of eight feet (8') (2400 mm) apart on pipe runs. Apply labels to both sides of pipe runs which are accessible from both sides.

1. In occupied areas, provide labels shaped like stop signs approximately 3 inches (75 mm) across with text reading:

FOLLOWING LABEL DOES NOT MEET REQUIREMENTS OF AHERA AND OSHA REGULATIONS AND SHOULD NOT BE USED IN LOCATIONS WHERE THESE REGULATIONS REQUIRE A LABEL. THIS LABEL IS INAPPROPRIATE FOR USE IN MECHANICAL EQUIPMENT AND BOILER ROOMS.

- a. **STOP**
Before Doing Work In This Area
See Custodian

END OF SECTION - 15254

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