BALTIMORE CITY PUBLIC SCHOOLS
MATERIALS MANAGEMENT DEPARTMENT

Contract No. IFB-24095

INVITATION FOR BIDS
Roof Replacement at
Mt. Washington School #221
1801 Sulgrave Avenue
Baltimore, MD 21209

Bid Due Date:

Thursday, March 14, 2024 11:00 A.M. Local Time

NOTE:
The attached forms in the response package shall be executed by responding vendors in sufficient detail to demonstrate that the vendor possesses the required qualifications, capacity, ability, and resources necessary to meet the requirements of this solicitation to the satisfaction of Baltimore City Public Schools (City Schools) and for the proper determination of the low responsible and responsive bidder.

In order to be eligible for consideration, bids must be submitted eMaryland Marketplace Advantage (eMMA) **by 11:00 am local time, Thursday, March 14, 2024**. **Bids submitted in any way other than via eMaryland Marketplace Advantage (eMMA) will not be accepted.**

Bids for this solicitation are being accepted solely via eMaryland Marketplace Advantage (eMMA) online submission through https://emma.maryland.gov. Bids will be opened electronically in eMMA as soon as practicable after the deadline for the receipt of bids in the solicitation. Bid results will not be given by phone.

Bids will not be accepted by email, fax, mail, or by hand delivery.

All Contractors bidding on this solicitation must first be prequalified by the Baltimore City Department of Public Works Contractors Qualification Committee at Room #634, Charles L. Benton Building, 417 E. Fayette Street, Baltimore, Maryland 21202. For additional information please call 410-396-6883.

Note: **Only MBE firms certified by the Maryland Department of Transportation (MDOT) can be utilized to meet the MBE requirements for the contract.**

For additional information and assistance please contact the M/WBE Liaison at (410) 396-8542 or e-mail to: mdsmith02@bcps.k12.md.us .

BID INFORMATION SHEET

I.	**Description of Work:**	Roof Replacement at Mt. Washington School #221
II.	**Location of Work:**	Mt. Washington School #221 1801 Sulgrave Avenue Baltimore, MD 21209
III.	**Documents Available At:**	In order to participate interested bidders must visit eMaryland Marketplace Advantage website at https://emma.maryland.gov/ and/or http://www.baltimorecityschools.org/Page/25290
IV.	**Pre-Bid Conference:**	Mandatory walk through at the project construction site will be on Thursday, February 22, 2024 at 10:00 a.m. For information contact: Project Manager: Ebony Johnson Office Telephone: 443-642-4396 Cell Telephone: 443-794-5773 Email: ejohnson@bcps.k12.md.us
V.	**Questions Due:**	February 27, 2024 by 4:00 p.m.
VI.	**Bid Due Date:**	Baltimore City Public Schools 200 East North Avenue, Room #401 Baltimore, MD, 21202 Thursday, March 14, 2024 by 11:00 a.m. local time
VII.	**Bid Opening:**	Baltimore City Public Schools Thursday, March 14, 2024 12:00 p.m.
VIII.	**Contact Person:**	Stuart Feldman, Senior Buyer Email: safeldman@bcps.k12.md.us

BALTIMORE CITY PUBLIC SCHOOLS
Department of Procurement

INSTRUCTIONS TO BIDDERS

eMaryland Marketplace Advantage (https://emma.maryland.gov/page.aspx/en/usr/login?ReturnUrl=%2fpage.aspx%2fen%2fbuy%2fhomepage) is the website where Baltimore City Public Schools publishes solicitations over $25,000 along with any addenda, associated materials, bidder/offeror questions, City Schools responses, and other solicitation related information.

Prospective bidders may purchase complete sets of contract documents at Gardens Reprographics, 419 St Paul Place, Baltimore, MD 21202, attention John Goodwin, 410-539-2763 or by downloading data from eMaryland Marketplace Advantage website at: https://emma.maryland.gov/page.aspx/en/usr/login?ReturnUrl=%2fpage.aspx%2fen%2fbuy%2fhomepage .

Correspondence between Contractors and City Schools related to this solicitation shall be directed to:

Mr. Stuart Feldman, Senior Buyer
Department of Procurement
200 E. North Avenue, Suite #401
Baltimore, MD 21202
Telephone: 443-984-3389
Fax: (410) 545-6977
Email: safeldman@bcps.k12.md.us

In order to be eligible for consideration, bids must be submitted via eMaryland Marketplace Advantage (eMMA) online portal **by 11:00 am local time, Thursday, March 14, 2024**. **Bids submitted in any way other than via eMaryland Marketplace Advantage (eMMA) will not be accepted.**

Bids for this solicitation are being accepted solely via eMaryland Marketplace Advantage (eMMA) online submission through https://emma.maryland.gov. Bids will be opened electronically in eMMA as soon as practicable after the deadline for the receipt of bids in the solicitation. Bid results will not be given by phone.

Bids will not be accepted by email, fax, mail, or by hand delivery.

Note: Only MBE firms certified by the Maryland Department of Transportation (MDOT) can be utilized to meet the MBE requirements for the contract.
For additional information and assistance please contact the M/WBE Liaison at (443) 642-3900 or e-mail to: mdsmith02@bcps.k12.md.us.

These Terms and Conditions shall apply unless otherwise stated in the Special Terms and Conditions attached to the individual solicitation.

1. INVITATION TO BID:

A. Baltimore City Public Schools invites all interested and qualified Contractors to submit sealed bids for the procurement of goods and services in accordance with the directions specified in these Instructions to Bidders.

B. DEFINITIONS: For the purpose and clarity of this document only, "City Schools" will mean Baltimore City Public Schools and/or the Baltimore City Board of School Commissioners. "Board" shall mean the Baltimore City Board of School Commissioners, and "Bidder" shall mean any reliable and interested party, Contractor, and/or manufacturer that submits a bid for this solicitation. "Awardee" is defined as the recipient of the contract awarded from this solicitation.

2. LIMITATIONS:

This Invitation for Bid (IFB) does not commit City Schools to award a contract or pay for costs incurred in the preparation of a response to this solicitation or procure or contract for services in connection herewith. City Schools reserves the right to accept or reject any or all responses received as a result of this request, or to cancel this solicitation in part or in its entirety.

3. PRE-BID SITE WALKTHROUGH:

There will be a mandatory pre-bid meeting/site walkthrough on **Thursday, February 22, 2024 at 10:00 a.m.**

A. Contractors will be given a walkthrough time based on the order on the sign-in sheet.

B. Each walkthrough will last approximately 45 minutes.

C. Only **two** representatives from each company will be permitted to walk the building.

D. All company representatives participating in the walkthrough must wear a facemask and adhere to social distancing guidelines. **Contractors not wearing a facemask will be prohibited from participating in the pre-bid walkthrough.**

4. SUBMISSION INSTRUCTIONS:

Bidders shall submit responses in the order and form listed below to expedite accurate evaluation by City Schools. Proposals that do not conform to these instructions may be rejected.

Bids for this solicitation are being accepted **solely via eMaryland Marketplace Advantage (eMMA) website**. The bid due date is **March 14, 2024, by 11:00 am/pm local time**.

Bids will not be accepted by fax, by email, mail, or by hand delivery.

Bidders who may have submitted a hard copy bid/proposal prior to this addendum must submit a timely bid/proposal via eMMA.

Be advised:

- Bid results will not be given by phone.
- A bid tabulation will be sent via email to all vendors submitting bids. Bids will not be publicly opened.

BID SUBMISSION REQUIREMENTS

1.0 ELECTRONIC BID/PROPOSAL SUBMISSION – TWO - PART SUBMISSION

A. Bids/proposals shall be submitted electronically via the eMaryland Marketplace Advantage (eMMA) website. Bid/proposal responses shall be submitted in PDF format. **Bids/Proposals will not be accepted by email, by fax, by mail or by hand delivery.**

B. Bidders/Offerors shall submit the following as **separate** documents:

1. Volume I (Attachment 1) – Bid Submission/Technical Proposal
2. Volume II (Attachment 2) – Minority Business Enterprise and Women's Business Enterprise (MBE/WBE) Commitment Utilization

C. The solicitation number should be included.

Bidders' response shall be submitted in PDF format.

Bids Shall Include:

- Bid Proposal Form
- Non-Collusion Affidavit
- Anti-Bribery Affidavit
- Debarment Affidavit
- Prequalification Certification Affidavit
- Bid Bond
- Certification of Work Capacity and a copy of the Certificate of Pre-Qualification by the Baltimore City Contractor Pre-Qualification Committee
- Copy of the State of Maryland Contractor's License
- Copy of the State of Maryland Certificate of Good Standing or other filing verifying the bidder is in good standing with the Department of Assessments and Taxation of Maryland
- Copies of your firm's Lead-Based Paint Certification, Renovator Certification and worker training records
- W-9 Form
- Insurance Certificate
- Baltimore City's YouthWorks Program forms

5. CONTRACT DOCUMENTS:

All respondents to this solicitation agree to comply with the AIA Standard Form of Agreement and General Conditions as modified by City Schools, as well as all terms and conditions contained herein, addenda, clarifications, specifications, drawings, other documentation, and requirements of this solicitation. These documents shall form the agreement between City Schools and the successful respondent.

All work performed under this contract and resulting from this solicitation, shall be in accordance with the documents listed herein, any addenda, and other components of the contract documents. The contract resulting from this solicitation is the AIA Agreement that addresses the full spectrum of construction projects. After receipt of a Notice of Intent to Award letter from City Schools, the apparent responsive and responsible low bidder **must** return the following within ten (10) business days:

A. Two (2) original Standard Forms of Agreement between City Schools and the Contractor fully executed, signed, and witnessed.

B. Payment and Performance Bonds in the total amount of award stated in the letter (Payment & Performance Bonds shall be provided as Contractor's overhead expenses without any additional cost to Baltimore City Public Schools). The cost to purchase Payment and Performance Bonds **will not** be reimbursed by City Schools.

If fully executed contract agreements and bonds are not received within 10 days or changes are made to the agreements your bid response will be evaluated as non-responsive, rejected, and City Schools may go against your bid check.

To avoid delays, any respondent who is not prepared to execute the AIA Agreement as reflected in the attached solicitation or not qualified to obtain performance and payment bonds, should not submit a bid response to this solicitation.

By submitting a bid, the respondent acknowledges that if awarded this contract they will accept all provisions contained within this solicitation without exception.

SPECIAL TERMS & CONDITIONS

1. SUMMARY OF WORK AND SPECIAL PROJECT FEATURES:

IFB-24095 Roof Replacement at Mt. Washington School #221 for Baltimore City Public Schools. A full *project description is shown in the Specifications and Drawings.*

2. TERM OF CONTRACT:

A. All work under this contract shall be completed within **eighteen (18) months or 540 days** from the issuance of the Notice to Proceed letter. If however, as a result of any act or omission by Baltimore City Public Schools and not by any fault of the respondent, or in the event that City Schools agrees that as a result of force majeure (strikes, acts of God, etc.) certain days are not chargeable as contract work days, the allotted time for work completion shall be increased by the number of days that City Schools determines work progress had been delayed or suspended. No compensation will be awarded for contract duration extensions. All prospective bidders may question the amount of completion time allowed and secure adjustments if circumstances warrant, before bids are submitted.

B. Termination for Convenience: The Baltimore City Board of School Commissioners reserves the right to terminate this contract for convenience upon thirty (30) days written notice to the Contractor. Baltimore City Public Schools may terminate this contract in whole or in part, whenever it determines that such termination is in its best interest, without showing cause, upon giving written notice to the Contractor. City Schools shall pay all reasonable costs incurred by the Contractor up to the day of termination and in no event shall the amount exceed the bid price.

3. DEFINITIONS:

By definition, the Project Manager is a City Schools employee, designated in writing by name to the Contractor. When the term "Project Manager" is used, it parenthetically includes their duly authorized representatives. A duly authorized representative is one or more persons, designated in writing by the Project Manager to the Contractor, to act on their behalf.

The Contractor shall report to and coordinate all project related matters with the City Schools Project Manager: **Ebony Johnson**
Email: ejohnson@bcps.k12.md.us
Phone: 443-642-4396
Cell: 443-794-5773

4. CONTRACTOR'S RESPONSIBILITIES:

A. The Contractor shall provide labor, materials, equipment, tools, construction machinery, transportation, and all services necessary for the proper execution and completion of this project as described in the contract documents and shall complete the project within the stipulated contract period.

B. The contract resulting from this solicitation shall include projects designed by City Schools. The Contractor must demonstrate the capacity to perform the work indicated in the contract documents.

C. Work under this contract should interfere with the operation of City Schools as little as possible. Buildings will remain occupied during construction; therefore, all work must be coordinated with school authorities to eliminate any interruption to activities, including building heating and ventilation. Work during normal school activities shall be performed during non-school hours, including evenings and weekends. **Noise, dust, and safety barriers in the form of temporary walls will be required to complete this work and should be included in the scope of Contractor's work.**

D. City Schools does not anticipate the addition of any alternative work items which may be listed in the contract specifications and/or drawings. Any additional and/or alternative work required during the life of the project will be performed at the sole discretion of City Schools via change order. If requested by the City Schools Project Manager, the Contractor shall submit a cost proposal for the additional/alternative work which will need written approval prior to the issuance of a change order.

E. All work under this solicitation shall be performed during the following working hours:

- Summer (Last day of school in June to August 15); Normal Working Hours: 7:30 am to 4:00 pm, Monday through Friday
- School Year (August 15 to the last day of school); 4:00 pm to 12:00 am, Monday through Friday. A portion of these hours may require the Contractor to reimburse City Schools for custodial coverage.
- No work that is audible and/or visible to community members within 300 feet of the school will be permitted between the hours of 7:00 pm and 7:00 am (including weekends) per City Code.
- Subject to the prior approval of the City Schools Project Manager, the Contractor may elect to perform work during other hours, weekends, or legal holidays, however, City Schools will not be responsible for any additional cost in excess of the bid price(s).

F. The Contractor shall be required to post State of Maryland construction signs per the sample included in the solicitation at no additional cost to City Schools.

G. The successful Contractor shall use the MD State Prevailing Wage requirements.

H. Removal and relocation of City Schools furniture, equipment, and other materials from a project site shall be completed by the Contractor and coordinated with the City Schools Project Manager. Upon completion of work, the Contractor will also be responsible for returning any furniture, equipment, or other materials back to the renovated area(s) or other areas within the facility as directed by the City Schools Project Manager.

I. All salvaged items shall be stored onsite in a location designated by the City Schools Project Manager, or their designated representative. The intent is to identify the best

components of existing materials for reuse, and non-suitable material will be disposed of upon review the City Schools Project Manager.

J. If roof penetrations are required, they shall be coordinated with the City Schools' Project Manager. The Contractor shall not do any roof penetrations without prior written permission of the City Schools Project Manager.

K. The Contractor shall obtain approval from the City Schools Information Technology (IT) Department to proceed with any work for all methods, materials, and supplies in school buildings related to information technology systems and telecommunications equipment installations, modification and replacement. The Contractor shall first contact the City Schools Project Manager who will provide contact information for the appropriate person(s) in IT. Work shall be governed by the 2010 City Schools Technology Infrastructure Standards. Copies of all documentation and correspondence regarding IT work shall be provided to the Project Manager for approval prior to beginning work. The Contractor shall be responsible for a complete and fully functional system, including all necessary switches, patch panels, or other components, whether included in the specification or not, at no additional cost to BCPS.

L. All IT drops/power locations shall be recessed inside gypsum board walls where no computer workstation or lookup station casework will cover surface mounted raceways (vertical raceways are not to be installed at existing or new gypsum wall areas in any main media center and shall also be recessed at gypsum board walls). Projector IT wiring/power shall be recessed at ceiling locations. Surface mounted raceways are acceptable at CMU walls or locations were concealed underneath permanent workstation casework only. A reasonable shifting in location of outlets and/or surface raceways shall be provided by the Contractor to meet field conditions, at no additional cost to City Schools. The Contractor will reuse and relocate existing patch panels, switches, existing CAT5 cables, etc. to accommodate new work, as required.

M. Contractors shall include the cost for any remediation and abatement oversight, monitoring, onsite PCM analysis, PCM or Transmission Electron Microscopy (TEM) lab test and analysis, final air sampling, and laboratory analysis of any asbestos and/or lead, if required, in their base bid, per the asbestos and lead reports provided in the solicitation, including all addenda. The abatement contractor is not permitted to directly hire the Industrial Hygienist. Unless stated otherwise, all projects are assumed to require some level of abatement or remediation.

5. LEAD BASED PAINT ACTIVITIES AND RENOVATIONS:

On April 22, 2010, the United States Environmental Protection Agency's (EPA) "Renovate Right" legislation (40 CFR 745, Subpart E) went into effect. The purpose of this legislation is to protect building occupants, particularly children under the age of six, against lead exposure risk that occurs during common renovation activities that disturb lead-based paint.

This rule affects renovation and remodeling contractors, maintenance workers, painters, and other specialty trades performing work in areas considered to be "child-occupied facilities" under the statute.

Child occupied facility means a building, or portion of a building, constructed prior to 1978, visited regularly by the same child, under 6 years of age, on at least two different days within any week (Sunday through Saturday period), provided that each day's visit lasts at least 3 hours, the combined weekly visits last at least 6 hours, and the combined annual visits last at least 60 hours. Child-occupied facilities may include, but are not limited to, day care centers, preschools, and kindergarten classrooms. Child-occupied facility encompass only those common areas that are routinely used by children under age 6, such as restrooms and cafeterias. Common areas that children under age 6 only pass through, such as hallways, stairways, and garages are not included. Additionally, with exteriors of public or commercial buildings that contain child-occupied facilities, the child-occupied facility would include the exterior sides of the building that are immediately adjacent to the child-occupied facility or the common areas routinely used by children under age 6.

Rule requirements include, but are not limited to the following:

- Renovation firms must apply to, and be certified by the EPA to perform renovations.
- A certified renovator (a person who has successfully completed training through an EPA accredited course) must be assigned to each renovation and must carry out other duties.
- Workers performing renovations must either be certified renovators or have been trained in the use of lead-safe work practices by a certified renovator.

City Schools contractors should be advised that if your firm has not met the statutory requirements of the EPA's "Renovate Right" rule for compliance with this legislation, your bid will be evaluated and rejected as nonresponsive.

To verify compliance with the "Renovate Right" rule, respondents shall include copies of your firm's certification, renovator certification, and worker training records with your bid response. Additional information related to the "Renovate Right" legislation can be found at www.epa.gov/getleadsafe. For questions and/or concerns related to this requirement please contact:

Manager, Environmental Compliance
Department of Health & Safety, Room 407A
Baltimore City Public Schools
200 E. North Avenue
Baltimore, MD 21202
Office 443-984-3617
Fax 410-659-6937

6. ORDER OF PRECEDENCE:

Any conflicts shall be governed by the following order of precedence:

A. Special Terms & Conditions
B. AIA Contract Agreement
C. Addendum(s)
D. Drawings
E. Specifications
F. City Schools' Bidding Requirements and Conditions
G. AIA General Conditions
H. Other Documents Included in Solicitation
I. Attachments

7. AUTHORITY OF BUILDING SUPERINTENDENT:

A. The Building Superintendent/School Principal is responsible for the public health, safety, and welfare of building occupants and exercises sole authority over City Schools staff and students, and may control the conduct of the Contractor's employees by request to the City Schools Project Manager.

B. The Building Superintendent/School Principal has the authority to modify or stop work of the Contractor's employees that may interfere with school programs and/or building operations. Such orders will be relayed through the City Schools Project Manager except in the case of an emergency.

8. BACKGROUND:

Baltimore City Public Schools serves the needs of public education in Baltimore City, covering approximately 77 square miles, with a residential population of more than 646,000. It is the fourth largest public school system in the State of Maryland.

City Schools operates 190 facilities over a ten-mile radius which includes elementary, middle, and high schools, special education centers, alternative schools, and administrative offices. Central Administration for City Schools is located at 200 East North Avenue, Baltimore, Maryland 21202.

The Buildings are owned by Baltimore City Government and operated by Baltimore City Public Schools.

Baltimore City Government has the right to approve and inspect the improvements to be made to the Buildings.

9. CONTRACTOR'S QUALIFICATIONS:

A. The Contractor shall submit detailed information to demonstrate that they possess the qualifications, ability, capacity, facilities, and resources to accomplish the work described in this solicitation.

B. Information shall be considered confidential other than any steps needed to verify its accuracy. However, City Schools will not assume any responsibility for accidental disclosure of information submitted by the Bidder. The ability of the Contractor to perform the required work will be decided by the Baltimore City Schools Chief Operating Officer and the Director of the Department of Procurement subject to the approval of the Board of School Commissioners. The Board of School Commissioners' decision shall be final.

C. The successful bidder shall be a General Contractor licensed in the State of Maryland in good standing with the Maryland Department of Assessments and Taxation. Bidders shall submit a State of Maryland Certificate of Good Standing or other filing verifying the bidder is in good standing with the Maryland Department of Assessments and Taxation. Certificates of Status may be obtained online at **http://www.dat.state.md.us**. Additionally, Contractors are required to possess all necessary licenses, insurances, and bonding for the work specified in this solicitation. The Contractor's ability to perform the required work will be decided by City Schools.

D. Proposals will only be considered from respondents that have been actively engaged in work of similar size and type for a continuous period not less than the preceding five (5) years, under the same management in effect at the time of bid submission.

E. The Contractor's Qualifications Verification Response shall be included as a part of the solicitation response. Failure to include the Contractor's Qualifications Verification Response could cause your bid to be evaluated as non-responsive.

F. The successful Bidder is required to have all of the necessary pre-qualifications by the Baltimore City Contractors Prequalification Committee for the required scope of work and dollar capacity of this project.

G. The awarded Bidder must self-perform the majority (>51%) of the work for the following trades: HVAC, fire alarms, sprinkler systems, elevators, roof replacement, and window and door projects as shown on the contract drawings with their own employees. This percentage of work may not be subcontracted. If City Schools determines this percentage will not be met at any point during the course of this project, it could be grounds for immediate contract termination.

10. KNOWLEDGE OF TERMS AND CONDITIONS:

Bidders, or their authorized representatives, are expected to familiarize themselves with work site conditions, requirements, drawings, and specifications before submitting bids. Failure to do so will be at the Bidder's own risk. Bidders cannot secure relief on the plea of error. Neither law nor regulations make allowances for errors of omission or commission on the part of Bidders.

11. PARTNERSHIPS:

Bids by partnerships must be signed with the partnership name by one of the members of the partnership or by an authorized representative, followed by the signature and designation of the person signing, who shall also state the names of the individuals composing the partnership.

12. CORPORATIONS:

Bids by corporations must be signed with the name of the corporation, followed by the signature and designation of the officer having authority to sign. When requested, satisfactory evidence of authority of the officer signing on behalf of the corporation shall be furnished. Anyone signing the bid as agent shall file satisfactory evidence of authorization to do so.

13. CERTIFICATES AND AFFIDAVITS:

Respondents are required to complete all of the certificates and/or affidavits included in this solicitation. These documents are required by local, state, or federal funding agencies of City Schools as part of the bidding process. These documents may include: Anti-Bribery Affidavit, Debarment Certificate, Minority Business Enterprise affidavit, Small Business Enterprise affidavit, and when applicable, and Asbestos Free Certification.

14. ADDENDA:

A. INQUIRIES:

i. No oral interpretation of the meaning of any contract documents will be made. To be given consideration, inquiries must be received in writing at least seven (7) days prior to the date of the bid opening.

B. INTERPRETATION OF DOCUMENTS:

i. During the proposal period, Bidders are to notify City Schools in writing seven (7) days prior to the proposal due date of any issue that could affect the bidding or fulfillment of this contract, including any discrepancies or omissions in the drawings and specifications. If no notification is made, it should be understood that these contract documents are clear as to their intent and shall be interpreted by City Schools as their true intent. The Bidder agrees to abide by the decision of the Director of Procurement on such matters.

ii. In observation of i. above, Bidders shall comply with the true intent of these specifications and not take advantage of any unintentional error or omission and report all errors and omissions once discovered. Bidders should fully complete every part of this solicitation to the true intent and meaning of the contract documents as decided by Baltimore City Public Schools Management. See “Order of Precedence” in regards to any conflicting information between documents.

C. ISSUANCE:

i. Any changes to bid documents will be made through via addendum. Failure of any Bidder to receive such addenda or interpretation shall not relieve them from any

obligations under this solicitation as amended by addendum. All addenda issued shall become part of the contract.

D. SYSTEM TOTALITY:

i. It is the responsibility of the Contractor to confirm the solicitation document's ability to fully meet the intent of the Scope of Work. Questions or issues discovered during the bid process shall be brought to the attention of the City Schools Project Manager.

E. ACCEPTANCE:

i. By submitting a proposal, responding firms acknowledge that if awarded this contract they will accept all of the provisions listed in this solicitation without exception.

15. BID BOND:

Bid Guarantee Deposit (bid proposals when filed, shall be irrevocable). All bids/proposals (unless otherwise noted) shall be accompanied by one of the following:

A. Bid check in amount equal to 2% of the total lump sum bid price, or

B. One-time bid bond equal to the total lump sum of the bid

C. Annual Bid Bond or Continuous Bid Bond which must be on file at the time of bid receipt

D. Bid checks in the amount of $5,000 or less shall be a check of any type drawn upon any solvent clearing house bank of the United States, a registered check or U. S. Postal Money Order

E. Bid check of more than $5,000 shall be made by a certified check, bank cashier's check or bank treasurer's check

F. All bid guarantees (unless otherwise noted) shall be made payable to **Baltimore City Board of School Commissioners**

Payment and/or Performance Bond requirements shall be promptly and properly executed. The requirements of prompt execution will be considered as fulfilled if accomplished within ten (10) working days after award. If the required contract documentation is not executed within the stipulated time, bid checks and/or a bid bond shall be forfeited to City Schools as liquidated damages, as required by Article VI, Section II of the City Charter, for failure to comply with this requirement. Upon execution of the contract agreement, payment, and/or performance bond, City Schools shall refund the amount deposited or release the amount charged against the bond as bid guarantee to the successful Bidder.

Bid guarantees posted by unsuccessful bidders shall be refunded or released by City Schools promptly after an award is made.

16. BID EVALUATION AND AWARD:

A. Contracts shall be awarded to the lowest responsive and responsible bidder, upon review and confirmation of required qualifications indicated in the Instructions to Bidders. Consideration will be given to the competency and responsibility of the Bidder, and the ability of the Bidder to perform satisfactorily. City Schools will consider the Bidder's record and performance of any prior contracts with City Schools, federal departments or agencies, or with other public bodies.

B. The award will be subject to final review and approval by the Baltimore City Board of School Commissioners.

C. Promptly after award by the Board of School Commissioners, the successful Contractor will receive an "Award Notification" letter from City Schools requesting all required paperwork. The awarded Contractor must submit the fully executed contract, performance, and payment guarantee bonds to the buyer within ten (10) working days after receipt of the request from City Schools. If all of the required documents are not fully completed and received within the time specified in the solicitation, award will be made to the next low responsive and responsible bidder and any difference in cost will be charged against the first low bidder’s bid bond.

Special Terms and Conditions

1. COMMENCEMENT OF SERVICES:

The City Schools Board of School Commissioners shall have no obligation to pay for services performed before the Board approves the contract and purchase order and notice to proceed have been issued. City Schools shall have no obligation to pay for services in excess of the amount of the award. The Contractor shall not be authorized to proceed with any work until a purchase order is issued by City Schools and received by the Contractor.

2. ANNULMENTS AND RESERVATIONS:

A. RIGHT TO REJECT: The Board reserves the right to reject any or all bids and re-advertise for other bids. The Board reserves the right to approve or disapprove the issuance of a purchase order and/or contract for the work described in this solicitation.

B. WAIVER OF TECHNICAL DEFECTS: The Board reserves the right to waive technical defects, if in its judgment is in the best interest of City Schools.

3. AUTHORITY TO DEBAR OR SUSPEND:

The Director of the City Schools Department of Procurement shall have the authority to debar a person or company for cause from consideration for award of contracts in accordance with the provisions of the City Schools Procurement Policies and Procedures available on the City Schools web site www.bcps.k12.md.us.

4. TERMINATION OF CONTRACT:

A. TERMINATION FOR NON-APPROPRIATION OF FUNDS: City Schools may terminate this contract, in whole or in part, due to insufficient funding or non-appropriation of funds with written notice to the Contractor. City Schools shall pay for all of any purchases up to the date of the termination notice.

B. TERMINATION FOR DEFAULT: If a Contractor has not performed or has unsatisfactorily performed, payment shall be withheld at the discretion of City Schools. Failure of a Contractor to fulfill their obligations shall be considered just cause for termination of the contract, and the Contractor will not be entitled to any costs incurred up to the date of termination. In the event of default by the Contractor, this contract may be terminated. See also Special Conditions for Construction Contracts.

C. TERMINATION FOR CONVENIENCE: City Schools has the right to withdraw from the terms of the contract, without liability or showing cause, by providing ten (10) calendar days written notice to the Contractor. The Contractor shall be compensated for services rendered prior to the date of termination.

5. GOVERNING LAW:

The bid shall be construed in accordance with and interpreted under any applicable laws, rules, regulations and ordinances of the City of Baltimore (local), State of Maryland, and Federal. Any lawsuits arising from this bid shall be filed in the Circuit Court of Baltimore City, Maryland. During the term of the contract resulting from this solicitation, the awarded Contractor(s) shall pay its employees a State of Maryland, Federal (Davis-Bacon Act) prevailing wage, if applicable, and Living Wage in accordance with all applicable City, State or Federal Living Wage legislation and regulations. The awarded amount of the contract resulting from this bid cannot be increased for the Contractor's failure to factor into its proposal any future increases in the Living Wage rates in effect at the time of this bid.

6. CONTRACT TERMS AND CONDITIONS:

City Schools reserves the right to short pay any line item invoice that does not agree with the line item price shown on the purchase order. All invoices are to be submitted using the AIA Form showing the purchase order number, project name and school, and the name and address of the Contractor and shall be mailed or delivered to the named Project Manager, Baltimore City Public Schools, Office of Facilities Design and Construction, Room 407A, 200 E. North Avenue, Baltimore, Maryland 21202 (unless otherwise noted).

A. INCORRECT INVOICES:

Invoices will be returned for correction unless they contain the following information: Item numbers, description of item, quantity, unit prices with extensions, and total. Each invoice shall reflect the City Schools purchase order number, and all the items on the invoice shall be listed in the same sequence as listed on the purchase order.

B. PARTIAL PAYMENTS:

Payment in full will only be made upon final acceptance of items as shown on the purchase order. Partial payments may be paid monthly in an amount proportional of progress to date.

C. LATE SUBMISSION OF INVOICES:

The Contractor's invoices are to be submitted in a timely manner, per the terms of the purchase order, after the services and/or the goods and materials have been provided. If invoices are submitted one calendar year after the Contractor's services have been provided, or the last date when goods and materials were accepted by the Board, City Schools shall have no obligation to pay these invoices.

D. CONFIDENTIALITY:

The Contractor acknowledges and agrees to hold all confidential information in the strictest confidence as a fiduciary and will not make any press release or public announcement, or voluntarily sell, transfer, publish, disclose, display, or otherwise make available to any third

persons such confidential information or any portion thereof without the express written consent of City Schools. The Contractor and its employees, agents, volunteers, and subcontractors shall maintain the confidentiality of all medical, psychological, and student records in compliance with federal and state laws. Additionally, the Contractor shall receive written consent from the parent or guardian of each student for the mutual disclosure of such records by and among the Contractor, City Schools and City Schools' employees, agents, volunteers and contractors.

E. INDEMNIFICATION:

The Contractor shall indemnify, defend, and hold harmless the Mayor and City Council of Baltimore (City) and the Baltimore City Public Schools Board of School Commissioners and their respective elected/appointed officials, employees, departments, agencies, agents and volunteers from any and all claims, demands, suits, and actions, including attorneys' fees, litigation expenses and court costs, connected therewith, brought against the City, the Board and their respective elected/appointed officials, employees, departments, agencies, agents, and volunteers, arising as a result of any direct or indirect, willful, or negligent act or omission of the Consultant or its employees**,** agents, or volunteers**.**

F. INSURANCE:

See AIA Document A201 for this information. The selected Contractor shall indemnify and hold harmless the Owner, City Schools, and Mayor and City Council of Baltimore City, and shall be added on any insurance policies and bonding.

E-COMMERCE:

City Schools has entered into an agreement with K12Buy.com to provide an e-commerce system to City Schools. The awarded Contractor will be required to provide a valid email address for communications with City Schools and K12Buy.com where purchase orders will be processed and sent. This is a free service to Contractors with no transaction fees being charged.

G. NON-ASSIGNABILITY:

This contract shall not be assigned, or services subcontracted in whole or in part without the written consent of City Schools. Any attempt to do so without such written consent shall be null and void and of no effect.

H. INDEPENDENT CONTRACTORS:

The Contractor is furnishing its goods and/or services as an independent contractor, and nothing herein shall create any association, partnership or joint venture between the parties or an employer-employee relationship.

I. GENERAL RECORDS CLAUSE:

The Contractor's contracts, files, accounts, records, and other documents related to this contract shall be open to examination and/or audit by City Schools and/or its designated agents and made available at any time upon reasonable prior notice, during the performance of this contract for a period of five (5) years after final payment or longer as required by law, rule, or regulations.

J. SOLE AGREEMENT:

This contract constitutes the sole agreement between the parties and no amendment, modification or waiver of any of the terms and conditions shall be valid unless in writing and executed by both parties. Any prior verbal agreements or bids shall not be considered a part of this contract.

K. PROTECTION OF PROPERTY:

The Contractor will use reasonable care to avoid damaging existing buildings, equipment, and property at jobsites as well as all materials furnished by City Schools. If damage has been caused, the Contractor must replace or repair it at no charge or expense to City Schools as directed by the Contracting Officer. If the Contractor fails or refuses to make such repair or replacement, the Contractor will be liable for the cost, which may be deducted from future payments.

L. PUBLIC STATEMENTS:

The Contractor shall not use or reference the name or emblem of Baltimore City Public Schools in issuing any press releases or making public statement with respect to this contract (unless it is required by applicable law, regulation, or the requirements of any listing agreement with any stock exchange), without prior written consent of City Schools, whose consent will not be unreasonably withheld. Purchase by City Schools of any articles, material, merchandise, or service does not imply adoption or endorsement of the product or service, and the use by any manufacturer, Contractor, merchant or other person of the name or emblem of City Schools in any advertisement is not authorized. The unauthorized use of the name or emblem of City Schools is prohibited by the United States Criminal Code - Section 706.

M. INSPECTIONS:

City Schools reserves the right to have inspectors on the manufacturer's premises during the manufacturing process of any products being furnished under this contract for as long as may be considered necessary. All expenses of the inspectors shall be paid by City Schools. The presence of the inspectors shall not relieve the awarded Bidder of responsibility for faulty workmanship of materials that may be discovered at any time after delivery and prior to final acceptance in accordance with these specifications. Access to the manufacturing facility shall be provided for the City Schools representative shall be

provided when requested.

N. USE OF BRAND NAMES:

Brand name and model numbers are offered as a reference for Bidders as to the style, size, weight, and other characteristics of the item(s) in the specifications. The use of brand names should not be interpreted to be the exclusive brand desired unless so stated. Acceptability and/or criteria for acceptability of an alternate will be at the sole discretion of City Schools. Additionally, Contractors should use products and materials made in USA whenever possible.

O. PRODUCT OFFERED BY THE BIDDER:

All products offered by the Bidder shall be new and unused, and the latest version. Should a specified product be discontinued and/or upgraded during the course of the contract, the Bidder shall offer a new alternate product that meets and/or exceeds the established specifications, under the same terms, conditions, and prices as the item originally offered. Contractor(s) shall utilize products and materials made in the USA whenever possible. This requirement shall apply to construction projects that are large enough to fall under the requirements of the Buy American Steel Act, Sections 17-301 to 17-306 of the Finance and Procurement Article of the Annotated Code of Maryland. For additional information please visit:

http://mgaleg.maryland.gov/webmga/frmStatutesText.aspx?article=gsf&section=17-301&ext=html&session=2020RS .

P. COMPLIANCE WITH SPECIFICATIONS:

The awarded Bidder shall abide by and comply with the true intent of these specifications and not take advantage of any unintentional error or omission, but shall fully complete every part as the true intent and meaning of the contract documents. The successful bidder, after award and before manufacture and/or shipment, may be required to provide detailed descriptive data to enable City Schools to judge the bidder's compliance with the specifications and utilization made in USA products and materials.

Q. PROPOSALS FOR DEVIATIONS TO SPECIFICATIONS:

Any deviation from the specifications must be noted in detail by the Bidder, in writing, seven (7) working days prior to the bid response date. This information will be evaluated by City Schools and shared with the entire list of possible bidders. The absence of a written list of specification deviations attached to the bid response will hold the Bidder strictly accountable to City Schools to the specifications as written. Any deviation from the specifications, without prior documented approval, will be grounds for rejection of the bid.

R. SUBCONTRACTORS:

The awarded Contractor shall give its constant personal attention to the faithful execution of this contract, keep the same under its own control, and not assign work, or any part thereof, without the previous written consent of City Schools. Bidders shall provide the names of all proposed subcontractor(s) they intend employing, the portion of the materials/labor to be furnished by each, their place of business, and any other information as requested in the bid submission instructions. This information may be used in considering the potential performance capabilities of the subcontractor(s).

S. SAFETY REQUIREMENTS:

The awarded Contractor shall insure that any equipment and machinery furnished and delivered to City Schools complies with all safety regulations as required by the Occupational Safety and Health Administration (OSHA) and the Maryland State Safety Health Act known as MOSHA. The Contractor shall sign the safety section, if attached in the bid proposal, certifying the regulations for the type equipment furnished shall meet all regulations applying to this type equipment meeting the CFR-1910 MOSHA Standard. The Contractor shall submit Material Safety Data Sheets (MSDS) for all items awarded to that Contractor provided under the terms of this proposal in accordance with OSHA Communication Standard 29 CFR 1910.101, 29 CFR 1910.1200 and 29 CFR 1926.58 or any other applicable state, federal, or local regulation. Prior to delivery of the items awarded, the Contractor must submit MSDS sheets to: Baltimore City Public Schools Director of Facilities, 200 E. North Avenue, Room 407A, Baltimore, Maryland 21202.

7. GUARANTEE AND WARRANTEES:

A. GENERAL: Payment shall be based upon acceptance of goods or services by City Schools. The Contractor expressly warrants that: (a) The merchandise to be furnished and services performed will be free from defects in material and workmanship and will be in full conformity with these specifications, drawings, representation, or sample; that this warranty shall survive acceptance and payment of the merchandise; and that the Contractor will bear the cost of inspection of all goods and services rejected. (b) The Contractor hereby provides a warranty of authorization as to all goods and services. (c) The goods or services furnished must be or have been mined, manufactured, or produced in full compliance with at least the minimum conditions required under the Fair Labor Standards Act of 1938, as amended, and all other applicable local state and federal laws, rules, and regulations to include Department of Transportation (DOT), Food and Drug Administration (FDA) regulations, and the Equal Opportunity Clause contained in Executive Order 11246, as amended. If applicable to the goods or services purchased herein, the Contractor must also be in full compliance with the Workplace Hazardous Materials Information System (WHMIS) legislation and maintain a written Hazard Communication Plan.

B. The awarded Contractor, its employees, agents, volunteers, and contractors who may have contact with students must be in compliance with Title 5, Subtitle 5, Part VI, of the Family Law Article of the Maryland Code. All costs shall be borne by the Contractor.

C. GUARANTEE PERIOD: The Contractor shall unconditionally guarantee all services, materials, and workmanship of all furniture, goods, and equipment furnished for a period of two (2) years from the date of acceptance, i.e., delivery and installation, unless a longer period of warranty is specified.

D. FURNITURE AND EQUIPMENT: If any defects or signs of deterioration are noted within the guarantee period, which in the opinion of City Schools are due to faulty design, installation, workmanship or materials, the Contractor shall repair or adjust the equipment or parts to correct the condition, or it shall replace the part or entire unit to the complete satisfaction of City Schools once notified at their expense. These repairs and/or replacements shall be made at times designated by City Schools.

E. EQUIPMENT: The Contractor agrees to provide onsite service of equipment within eight (8) hours of notification by school system personnel. Loaner equipment shall be supplied free of charge during the warranty period if the equipment cannot be repaired within three (3) working days.

F. OTHER EQUIPMENT: Certain pieces of equipment, machinery, and refrigeration will require guarantees other than detailed above. Refer to the General Conditions for requirements on specific equipment.

G. MANUFACTURER'S AGENT: The Contractor shall act as the manufacturer's agent for all warranty claims.

8. CONTRATOR DISQUALIFICATION – BRIBERY:

A person convicted of bribery, attempted bribery, or conspiracy to bribe shall be disqualified from entering into a contract with any city or other subdivision of the State of Maryland. Every business entity upon submitting a proposal or otherwise applying for a contract shall submit an affidavit stating whether it, its officers, directors, or partners, or its employees have been convicted of bribery, attempted bribery, or conspiracy to bribe under the laws of any State or Federal Government. Please see below State of Maryland Public Ethics Law, Title 15.

The Maryland Public Ethics Law prohibits State employees or officials (and in some cases, former employees) and businesses in which such an individual is employed or holds a financial interest from (i) submitting a proposal or proposal, (ii) negotiating a contract, and (iii) entering into a contract with the governmental unit with which the individual is affiliated per the Maryland Code, State Government Article, SS 15-502.

If the Bidder has any questions concerning application of state ethics laws to their participation in this procurement, it is incumbent upon them to seek advice from the State of Maryland Ethics Commission, 9 State Circle, Suite 200, Annapolis, MD 21401, Telephone (410) 974-2068.

The procurement officer may refer any issue raised by a Bidder to the State of Maryland Ethics Commission and may require the Bidder to obtain advice from the State of Maryland Ethics Commission and may reject a proposal that would result in a violation of ethics law.

The resulting contract is cancelable in the event of a violation of the State of Maryland Public Ethics Law by the vendor or any State of Maryland employee in connection with this procurement.

9. CRIMINAL BACKDROUND CHECK:

A. Criminal Background Check:

Effective July 1, 2015, amendments to § 6-113 of the Education Article of the Maryland Code further require that a Contractor or subcontractor for a local school system may not knowingly assign an employee to work on school premises with direct, unsupervised, and uncontrolled access to children, if the employee has been convicted of, or pled guilty or nolo contendere, to a crime involving a sexual offense, child sexual abuse and crimes of violence. It is the responsibility of the Consultant to make certain that its employees, agents, volunteers, and contractors who have contact with students be fingerprinted and have a background check in compliance with Title 5, Subtitle 5, Part VI, of the Family Law Article of the Maryland Code.

B. Employees Having Direct Contact with Students:

All current and future employees of the Consultant who may have direct contact with students must have a criminal background check and fingerprinting conducted by the Human Resources Department of City Schools before beginning work. Previous background checks will not be accepted. The fee for the background check shall be paid by the Consultant via check or money order at the time of fingerprinting. No employee can begin work in a city school until results have been received. Violation of this provision may result in Termination for Cause.

C. Employees Do Not Have Direct Contact With Students:

Employees of a Consultant placed in a city school who will not have direct contact with students must have Criminal Justice Information Service (CJIS) and NCIC background checks on record. Copies of the background checks must be forwarded to the contract monitor before services can commence. Every two years the Consultant shall submit copies of background checks to the contract monitor. Should any employee be flagged during the term of this agreement, the Consultant shall contact the contract monitor within 24 hours of notification. Violation of this provision may result in Termination for Cause.

D. Employment of Sex Offenders:

The Consultant shall be compliant with the Criminal Procedure Article of the Annotated Code of Maryland Section 11-722 at all times, which states that a person who enters a contract with a County Board of Education or a nonpublic school may not knowingly employ an individual to work at a school if the individual is a registered sex offender. If a registered sex offender is employed by the Consultant, the Consultant is prohibited from assigning that employee to perform management, delivery, installation, repair, construction or any other type of services on any City Schools property. Violation of this provision may result in Termination for Cause.

10. REQUESTS FOR INFORMATION:

A. During the Construction Phase, the Contractor may submit a written Request for Information (RFI) and is responsible for its prompt delivery to the Project Manager via email. The City Schools Project Manager will provide written responses via email. City Schools will not be responsible for any other explanation or interpretation given prior to the award of contract.

B. The Contractor shall abide by, and comply with, the true intent of these specifications and not take advantage of any unintentional errors or omissions, but shall, upon discovery, immediately report all errors and omissions to the City Schools Project Manager.

11. PERMITS:

The Contractor shall submit applications, obtain, and pay all fees for all permit(s) required by the authorities having jurisdiction. The Contractor's actual permit cost without any markup shall be included in the fixed base bid price submitted with their bid. Copies of all permits and paid receipts shall be to be furnished to the City Schools Project Manager.

12. WORK ARRANGEMENTS:

Work will be scheduled at the convenience of City Schools. Prior to commencing work, the Contractor must provide a work schedule that will not interfere with the facility's daily operations. All scheduling of work shall be coordinated with, and approved by, the City Schools Project Manager and School Principal.

Baltimore City Public Schools may request the Contractor to work at specific times to perform demolition or abatement work, work requiring utilities outages, avoid days that student testing is scheduled, or as required to meet the construction schedule completion. Should after hours work be scheduled City Schools' staff will be required to open and close the school building. The Contractor shall be responsible to compensate the City Schools Office of Planning, Leasing and Permits for all related expenses for City Schools staff. Regular salary, overtime and/or double may be required for City Schools staff in cases where work will be done on Saturday, Sunday and Holidays per City Schools' requirements.

Contractor shall inform City Schools one (1) week in advance of any utility shut downs in school buildings. Any kind of shut down for inter-connection of piping shall be done on the weekends with prior notice to the City Schools Project Manager. After hours work requests are to be made to the City Schools Project Manager a minimum of 72 hours in advance of the requested date(s) of coverage.

Work should be planned to proceed in an orderly and continuous manner, without undue delay. Submission of samples, shop drawings, schedules, etc. shall be anticipated to avoid delays. City Schools reserves the right to direct the order in which work shall be performed.

13. SITE STORAGE OF MATERIALS:

Permission for the storage of materials and/or tools must be obtained from the City Schools Project Manager in advance and shall be done safely and in such a manner that doesn't interfere with City Schools operations.

It shall be the sole responsibility of the Contractor to protect and safeguard their materials, tools and equipment. City Schools assumes no responsibility for vandalism or theft during the term of the contract. The Contractor shall be responsible for any accidents caused by negligence.

The Contractor shall remove all unused materials, supplies and/or equipment within one (1) day after work is properly completed and accepted by the City Schools Project Manager.

14. PROGRESS MEETINGS AND REPORTS:

Progress meetings shall be held when and if the City Schools Project Manager finds them necessary to expedite completion of work. The Contractor, subcontractors, material suppliers, and other parties concerned with the current and/or future progress of work shall be represented at these meetings by persons familiar with the details of this project and authorized to conclude such matters, including establishment of work schedules, etc. The architect shall record meeting minutes and distribute minutes to the attendees for review and revision, as required.

15. CONTRACTOR'S SUPERVISION:

The Contractor shall have a responsible and experienced English speaking supervisor on site at all times for his employees and subcontractors when work is in progress. The Contractor will be responsible for the safety of his workers, the public, building occupants, and any damage to the premises during the duration of the contract.

16. TAXES:

The State Legislature has abolished the sales tax exemption for Contractors who purchase supplies or equipment for construction, repair, or alteration of City Schools' buildings for contracts advertised for bids after July 1, 1968, (Act of 1968, Ch. 452). The Contractor must pay the regular sales tax on any items purchased for use in the execution of such contract. See Business Tax Tip #6 at http://business.marylandtaxes.com/news/taxtips/business/bustip06.asp .

No markups will be permitted on any taxes under this contract.

17. CHANGE ORDERS:

Prior written authorization must be obtained from City Schools before performing any change work. If change work is required during the life of the project, it will be performed at the sole discretion of City Schools. The Contractor shall submit change order requests in compliance with the attached Contract Modification Procedures and related forms.

18. PAYMENTS:

The Contractor shall only be paid for work performed to date, at the time of invoicing. Additional work authorized by Change Order shall be billed separately upon completion, to the approved Change Order value.

Final payment will be made upon receipt and final acceptance of invoice(s) and all supporting documentation as required by City Schools.

19. PROGRESS PHOTOGRAPHS:

For Projects where the Contract Sum is greater than $5,000, the Contractor shall submit two copies of 8" x 10" color photographs of the site condition before construction begins and two copies of 8" x 10" color photographs after Final Completion.

20. LIQUIDATED DAMAGES:

The Baltimore City Public Schools Director of Procurement reserves the right to charge the Contractor **$250.00** per calendar day for each day that materials, equipment and/or services are not delivered in accordance with the delivery schedule mutually developed by the Contractor and City Schools. Per day charge shall be invoked at the sole discretion of the Baltimore City Schools Director of Procurement. The sum shall be taken as liquidated damages and not as a penalty.

21. SAFETY EQUIPMENT:

All necessary safety equipment, barricades, signs, flashing lights, or other equipment as required for the type of work in accordance with current OSHA, MOSHA and EPA rules and regulations, including those of the using agency governing the work to be done supplied by the Contractor shall be kept and maintained in good condition.

22. GENERAL LEGAL COMPLIANCE:

It shall be the Contractor’s sole responsibility to insure they are in compliance with all applicable federal, state, and city laws, rules, ordinances, statutes, all Board Policies and Regulations etc. that may impact this contract. City Schools shall bear no responsibility for monitoring the Contractor’s compliance with these legal requirements. If the Contractor fails to maintain legal compliance, City Schools may find the Contractor in default.

23. PREQUALIFICATION OF CONTRACTORS AND SUBCONTRACTORS.

All respondents to the solicitation must meet the qualifications indicated in the Instructions to Bidders.

All bidders are required to be prequalified with Baltimore City Department of Public Works Contractors Prequalification Committee. Only bids of contractors and subcontractors holding a prequalification certificate at the bid opening day and time will be considered. For additional information please call 410-396-6883. If the contract dollar value when added to the Contractor's uncompleted backlog at the time of award exceeds the Contractor's assigned Work Capacity Rating, their bid will be evaluated as non-responsive. Subcontractors intending to perform work in excess of $25,000 on this contract must have established qualification for an adequate Work Capacity Rating and the necessary Work Classification(s) before they are permitted to commence work.

24. EMPLOY BALTIMORE:

On June 9, 2011 the mayor signed an Executive Order titled Employ Baltimore, which applies to this solicitation. The contractor’s requirements are summarized below. (See Section B for the

applicable forms to be submitted with your bid or proposal.)

A. Bidders shall complete the Employ Baltimore Certification Statement contained in the Bid Document and submit it with their bids. (See section B.)
B. Within two (2) weeks of receiving the award of a City contract, the Contractor shall schedule a meeting with MOED to: (a) assess its employment needs, and (b) discuss other services provided by MOED. If applicable, MOED will then tailor specific hiring and/or training programs to benefit the contractor. The contractor will not receive its first progress payment under this contract, unless and until the meeting has been scheduled.
C. Should the Contractor's workforce plan indicate a need to fill new jobs, the Contractor must agree to post these positions through MOED and its One Stop Career Center Network for a period of seven (7) days prior to publicly advertising the openings. This will enable MOED to identify and refer qualified City residents to the Contractor as candidates for these job opportunities.

Each contractor shall submit an Employ Baltimore Employment Report to MOED on June 30th and December 31st during each year of its contract, and at the end of the contract, indicating the number of City residents on its payroll. The submission of the Employments Reports as required shall be a condition precedent to the City's release of a final payment or any and all retainage held by the City, pursuant to the contract.

25. BALTIMORE CITY'S YOUTHWORKS PROGRAM:

The City of Baltimore has promulgated an Executive Order regarding the Baltimore City YouthWorks program which is designed to assist youth between the ages of 14 and 21. All contractors, consultants, vendors etc. are encouraged to employ skilled and qualified Baltimore City youth between the ages of 14-21 who meet the job-ready status, as defined by the Baltimore City's Youth Works Program. There is no cost to bidders but you are required to complete and submit the forms attached to this solicitation along with your bid response package. Failure to submit the information at the time requested may be cause to have your bid rejected.

26. MINORITY BUSINESS PARTICIPATION:

<u>All Contractors shall provide a current copy of the MBE certificate(s) for each subcontractor with their bid response.</u>

Only MBE firms certified by the Maryland Department of Transportation (MDOT) can be utilized to meet the MBE requirements for the contract.

In accordance with §14-303(b)(5) of the State Finance and Procurement Article ("SFP"), the Board of Public Works promulgated regulations requiring all contracts with Minority Business Enterprise (MBE) participation goals to include a liquidated damages provision (COMAR 21.11.03.10(E)). Code of Maryland Regulations 21.01.03.02 provides that "Each regulation adopted under this title that is in effect on the date of award of any procurement contract...is applicable to the contract." *See also* SFP § 11-206(a). Therefore, the MBE liquidated damages requirement became effective for all contracts awarded on or after May 13, 2013.

As per State of Maryland Procurement Regulation 21.11.03, all solicitations issued on or after June 9, 2014 MBE Prime contractors can be counted up to (50%) towards the entire MBE Goal, and up to 100% towards any one of the MBE subgoals.

A. The overall goal for certified minority subcontractor participation in this contract is **25%** as specified in the solicitation and, which shall include sub goals of **8%** for certified African American-owned businesses and **11%** for certified women-owned businesses, if applicable.

B. For additional information and assistance related to MBE subcontractor participation please contact the M/WBE Manager at 443-642-3900 or e-mail mdsmith02@bcps.k12.md.us , or contact the State of Maryland MDOT Office.

C. For bids less than $50,000.00, MBE subcontractor participation is not required.

27. MBE PROGRAM LIQUIDATED DAMAGES:

City Schools and the Awardee acknowledge and agree that the program will be damaged (including, but not limited to loss of goodwill, detrimental impact on economic development, and diversion of internal staff resources), if the Awardee does not comply with the requirements of the MBE Program and related contract provisions. Because such damages would be difficult, if not impossible, to ascertain with precision, the Awardee agrees that upon determination by City Schools that the Awardee failed to comply with one or more of the specified requirements of the MBE Program or related contract provisions, the Awardee shall pay liquidated damages to City Schools calculated in accordance with the rates set forth below. The Awardee expressly agrees that City Schools may withhold payment on any invoices to offset liquidated damages owed. Awardee further agrees that for each specified violation, the agreed upon liquidated damages are reasonably proximate to the loss City Schools is anticipated to incur as a result of such violation. City Schools may waive the liquidated damages payable under this section if it determines that the Awardee has made a good faith effort to comply with the specified requirements of the MBE Program or related contract provisions, or that reasons exist for waiving the liquidated damages payable hereunder. Nothing in the foregoing sentence shall be construed as granting City Schools the option to waive liquidated damages in order to seek actual damages instead. City Schools reserves the right to terminate this Agreement and, except as expressly set forth above, exercise all other rights and remedies provided in this Agreement or by law. The rates for calculating liquidated damages shall be:

A. Failure to submit each monthly payment report in full compliance of this Agreement: $120 per day until the monthly report is submitted as required.

B. Failure to include a provision requiring submission of payment reports in its agreements with MBE subcontractors in full compliance of this Agreement: $60 per MBE subcontractor.

C. Failure to comply with terms of this Agreement in terminating, canceling, or changing the scope of work/value of a contract with an MBE subcontractor and/or amendment of the MBE participation schedule set forth in the Awardee MBE Affidavit: the difference between the dollar value of the MBE participation commitment on the MBE participation schedule for that specific MBE firm and the dollar value of the work actually performed by that MBE firm under this Agreement.

D. Failure to meet Awardee total MBE participation goal and sub goal commitments: the difference between the dollar value of the total MBE participation commitment on the MBE participation schedule and the MBE participation actually achieved.

E. Failure to promptly pay all undisputed amounts to a subcontractor in full compliance with the prompt payment provisions of this Agreement: $100 per day until the undisputed amount due to the subcontractor is paid.

28. PREVAILING WAGE REQUIREMENTS (State of Maryland or Davis-Bacon): https:///www.dllr.state.md.us/prevwage

It is mandatory for the successful bidder and their subcontractors to pay the prevailing wage to all workers under their employ as required by the State of Maryland, Department of Labor, Licensing and Regulations, Division of Labor and Industry for projects **in amounts over $250,000.00** in the execution of this contract.

Reference: Annotated Code of Maryland State Finance and Procurement, Section 17-201 through 17-226 and 17-209. The State has enacted a prevailing wage statute for public works contracts. *State Finance & Proc*. § 17-214 requires that a contractor on such a contract pay to employees the wage rate prevailing in the area as found by the State's Commissioner of Labor and Industry. However, it does not apply to contracts for less than $500,000 or contracts for which the federal prevailing wage law applies. § 17-202. The statute only applies to contracts made by "public bodies", defined as the State, its units, or any governmental body with respect to "any public work for which 50% or more of the money used for construction is State money." § 17-201 (i). The prevailing wage statue applies to appropriate construction contracts made by local boards of education. 69 Op. Atty. Gen. Md. 220 (1984); *Demory Brothers v. Board of Public Works*, 20 Md. App. 467, *affirmed*, 273 Md. 320 (1974).

The Contractor shall submit two (2) complete copies of their payroll records and the payroll records of each of their subcontractors; one (1) copy to the Contracting Office (City Schools) and one to the Commissioner of Labor & Industry, Prevailing Wage Unit, 1100 N. Eutaw Street, Room 607, Baltimore, MD 21202. These payroll records must be submitted within fourteen (14) calendar days after the end of each payroll period.

For any questions concerning this matter please contact Ms. Katrina Williams, Wage and Hour Investigator, Division of Labor & Industry, Prevailing Wage Unit at 410-767-2365 or 410-767-2395, e-mail: kawilliams@dllr.state.md.us.

29. LIVING WAGE PROGRAM (City of Baltimore):

During the term of the contract resulting from this solicitation the awarded vendor(s) shall pay its employees a living wage (if applicable) in accordance with the Baltimore City Living Wage legislation and regulations. The City's current Living Wage can be obtained by going to http://www.baltimorecity.gov/government/wage/index.html or by contacting the Baltimore Wage Commission at 410-396-4835.

Interagency Commission on School Construction

Construction Signage Instructions

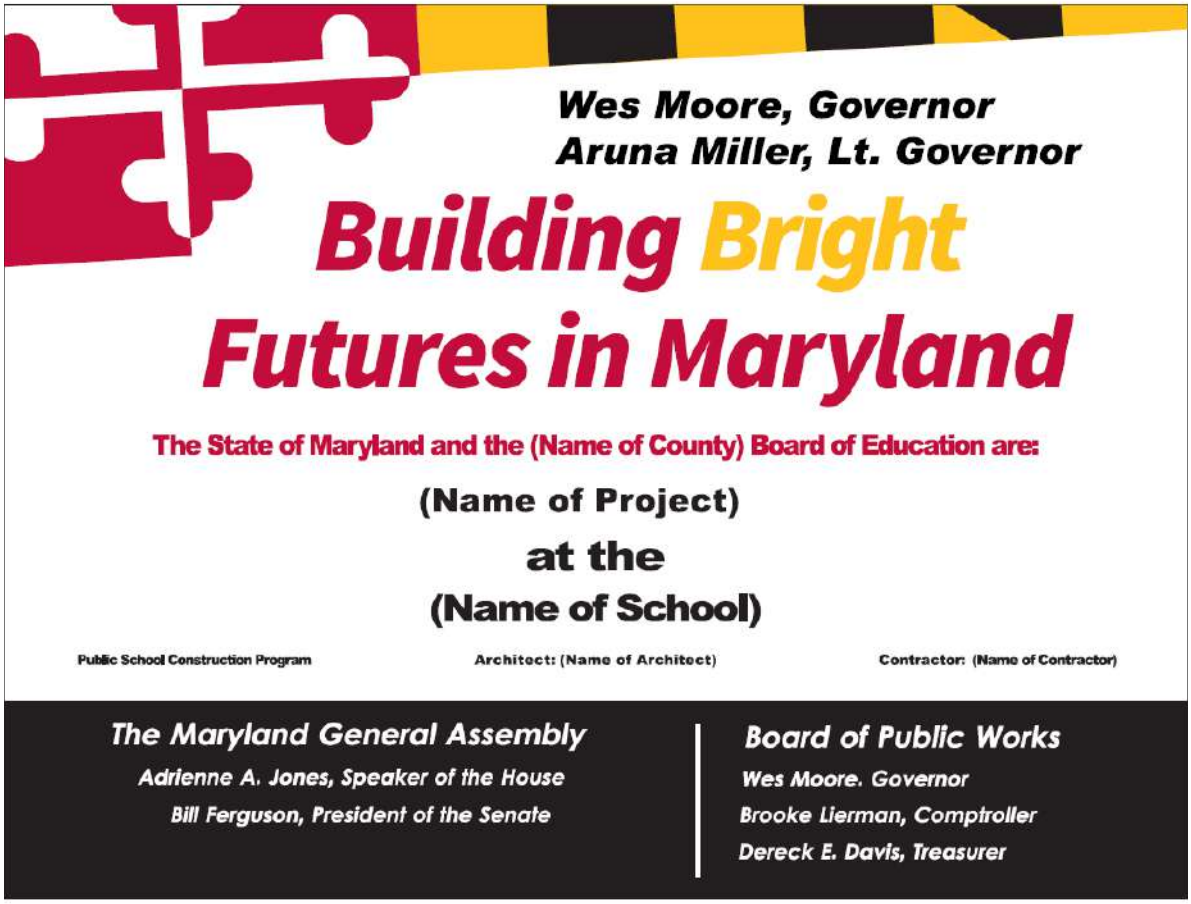
Please refer to the IAC's Administrative Procedures Guide for full details regarding the construction signage required for State funded school construction projects.

In cases where signage is required, signage is available through Maryland Correctional Enterprises (MCE).

MCE can be reached at:

Maryland Correctional Enterprises (MCE) Sign Plant #11
C/O Patuxent Institution
Attention: Christian Mayne, Plant Manager
7555 Waterloo Road Jessup, MD 20794
(410) 799-5102
christiane.mayne@maryland.gov
www.mce.md.gov

Signage Template:



Plaque Template:

The plaque should be 12” x 18” and include the following text:

STATE FUNDS FOR THE (select appropriate option from list below)
THIS SCHOOL BUILDING WERE PROVIDED THROUGH
THE PUBLIC SCHOOL CONSTRUCTION PROGRAM
(DATE)
BOARD OF PUBLIC WORKS
WES MOORE, GOVERNOR
BROOKE LIERMAN, COMPTROLLER
DERECK E. DAVIS, TREASURER

Options to be selected and inserted:

- “...CONSTRUCTION OF...”
- “...CONSTRUCTION OF AN ADDITION TO...”
- “...RENOVATION OF...”
- “...CONSTRUCTION OF AN ADDITION AND RENOVATIONS TO...”

Vendor's Solicitation Response Package

BALTIMORE CITY PUBLIC SCHOOLS
MATERIALS MANAGEMENT DEPARTMENT

Contract No. IFB-24095

INVITATION FOR BIDS
Roof Replacement at
Mt. Washington School #221
1801 Sulgrave Avenue
Baltimore, MD 21209

Bid Due Date:

Thursday, December 21, 2023 11:00 A.M. Local Time

NOTE:
The attached forms in the Response Package shall be executed by all responding vendors in sufficient detail to demonstrate that the vendor possesses the required qualifications, capacity, ability and resources to accomplish the work as set in the solicitation, all to the satisfaction of the Baltimore City Public Schools (City Schools) and for the proper determination of the responsible and responsive vendor.

Bids for this solicitation are being accepted **solely via eMaryland Marketplace Advantage (eMMA)**. The bid due date is **March 14, 2024 by 11:00 am local time**. **Bids submitted in any way other than via eMaryland Marketplace Advantage (eMMA) will not be accepted.**

Bids for this solicitation are being accepted solely via eMaryland Marketplace Advantage (eMMA) online submission through https://emma.maryland.gov. Bids will be opened electronically in eMMA as soon as practicable after the deadline for the receipt of bids in the solicitation. Bid results will not be given by phone.

Bids will not be accepted by email, fax, mail, or by hand delivery.

Note: **Only MBE firms certified by the Maryland Department of Transportation (MDOT) can be utilized to meet the MBE requirements for the contract.**

For additional information and assistance please contact the M/WBE Liaison at (443) 642-3900 or e-mail to: mdsmith02@bcps.k12.md.us .

BID INFORMATION SHEET

I.	**Description of Work:**	Roof Replacement at Mt. Washington School #221
II.	**Location of Work:**	Mt. Washington School #221 1801 Sulgrave Avenue Baltimore, MD 21209
III.	**Documents Available At:**	In order to participate interested bidders need to visit eMaryland Marketplace Advantage website at https://emma.maryland.gov/ and/or http://www.baltimorecityschools.org/Page/25290
IV.	**Pre-Bid Conference:**	Mandatory walkthrough of the project construction site will be on Thursday, February 22, 2024 at 10:00 a.m., for information contact: Project Manager: Ebony Johnson Office Telephone: 443-642-4396 Cell Telephone: 443-794-5773 Email: ejohnson@bcps.k12.md.us
V.	**Questions Due**	February 27, 2024 by 4:00 p.m.
VI.	**Bid Due Date**	Thursday, March 14, 2024 by 11:00 A.M. local time via eMaryland Marketplace Advantage (eMMA)
VII.	**Bid Opening:**	Thursday, March 14, 2024 12:00 P.M.
VIII.	**Contact Person**	Stuart Feldman, Senior Buyer Email: safeldman@bcps.k12.md.us

Responding Contractor(s),

The forms included in the response package shall be executed by all responding Bidders in sufficient detail to demonstrate that the Contractor possesses the required qualifications, capacity, ability and resources to accomplish the work as set in the solicitation, all to the satisfaction of Baltimore City Public Schools (City Schools) and for the proper determination of the low, responsible and responsive bidder.

All attached forms shall be submitted on or before the bid due date and time via eMaryland Marketplace Advantage (eMMA) website at: https://emma.maryland.gov/page.aspx/en/usr/login?ReturnUrl=%2fpage.aspx%2fen%2fbpm%2fprocess_browse

BID FORM

(SUBMIT IN DUPLICATE)

BID DUE DATE: March 14, 2024 by 11:00 a.m. Local Time

CONTRACT NO: IFB-24095

PROJECT TITLE: Roof Replacement at Mt. Washington School #221
Baltimore City Public Schools

THIS BID SUBMITTED BY: _____
(Company name)

_____
(Address)

_____

Principal Name, Title, Phone, FAX & E-Mail

_____

REGISTERED MARYLAND CONTRACTOR NO. _____

SUBMITTED TO: The Baltimore City Board of School Commissioners Baltimore, Maryland

The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with THE BALTIMORE CITY BOARD OF SCHOOL COMMISSIONERS, hereinafter referred to as the OWNER, in the form included in the contract documents to complete all work specified or indicated in the solicitation documents for the bid price and within the time indicated in this solicitation and in accordance with the contract documents.

BIDDER has examined the site and locality where work is to be performed, the legal requirements (federal, state and local laws, ordinances, rules and regulations), and the conditions affecting cost, progress or work performance, and has made such independent investigations, as the BIDDER deems necessary.

The Owner reserves the right to select or reject any, all, or none of the alternates in any order.

ADDENDA

Receipt of the following addenda to the Contract Documents is hereby acknowledged:

Addendum No._____ Dated_____ Addendum No. _____ Dated _____
Addendum No._____ Dated_____ Addendum No. _____ Dated _____
Addendum No._____ Dated_____ Addendum No. _____ Dated _____

BID PROPOSAL

PROPOSAL OF: _____

ADDRESS: _____ ZIP CODE: _____

BID DUE DATE: March 14, 2024

SOLICITATION TITLE: Roof Replacement at Mt. Washington School #221
Baltimore City Public Schools

TO THE BOARD OF SCHOOL COMMISSIONERS OF BALTIMORE CITY:
The undersigned agree to furnish all labor, materials, equipment, services, and training necessary for the roof replacement at Mt. Washington School #221 for Baltimore City Public Schools in accordance with the attached specifications, drawings and other related contract documents.

The entire work specified shall be completed for the following price:

ITEM #1: Roof Replacement at Mt. Washington School #221:

_____Dollars and_____Cents ($_____)

ITEM #2: Alternate Item #1: Allowance of $75,000.00 for any Unforeseen Work Including HAZMAT Testing and Remediation:

_____Dollars and_____Cents ($_____)

ITEM #3: Unit Prices: Unit Price #1 Brick Repair Description: Repair existing exterior brick wall as mutually agreed upon by Owner and Contractor upon review of field conditions during construction time period.

Provide price per square foot based upon 500 S.F. of existing brick repair:

$_____ Per S.F x 500 S.F = $_____

ITEM #4: Unit Prices: Unit Price #2 Tuck Pointing Description: Tuck-Point Brick Masonry as mutually agreed upon by Owner and Contractor upon review of field conditions during construction time period.

Provide price per L.F. based upon 1,000 L.F. of masonry tuck-pointing

$_____ Per S.F x 1,000 L.F. = $_____

BID TOTAL: Total of Item #'s 1 through 4

_____Dollars and_____Cents ($_____)

TERMS: NET 30
F.O.B.: DELIVERED

BASIS OF AWARD: This contract shall be awarded to the lowest, qualified, responsive and responsible bidder based on per item or total lump sum cost whatever is in the best interest of Baltimore City Public Schools. Negative references received will affect award of the project.

SCHEDULE:

The undersigned agrees that if awarded a contract, they will expeditiously complete all work in a manner consistent with the approved construction schedule to ensure completion within the prescribed time limits.

REPRESENTATION:

In submitting this Bid, the undersigned Bidder represents that:

a. It has read and understands the contract documents, particularly the General Conditions, and his/her bid is made in accordance therewith.

b. It has visited the site, familiarized itself with the local conditions under which work is to be completed, compared the site with the plans and specifications; satisfied themselves of the conditions of delivery, handling, and storage of materials, and all other matters which may be incidental to the project, before submitting its bid.

c. Its bid is based upon the materials and equipment described within the solicitation documents without exception.

d. It has read the contract and understands all the terms and conditions and will execute it without exception.

ATTACHMENTS

The following items shall be completed, attached to this bid form and shall be submitted to City Schools with the Contractor's bid:

1) Bid Proposal Form
2) Non-Collusion Affidavit
3) Anti-Bribery Affidavit
4) Debarment Affidavit
5) Prequalification Certification Affidavit
6) Bid Bond
7) Copy of the current Baltimore City Contractor and Subcontractors Prequalification Certificates
8) Contractor Qualifications Verification Response.
9) Copy State of Maryland Contractors License
10) Copy State of Maryland Certificate of Good Standing or other filing verifying the bidder is in Good Standing with the Department of Assessments and Taxation of Maryland.
11) Copies of your firm's Lead-Based Paint Certification, Renovator Certification and worker training records.
11) W-9 Form
12) Insurance Certificate
13) City's YouthWorks Program - Baltimore City
14) Minority Business Enterprise documentation as required, forms

NON-COLLUSION CERTIFICATE
(TO BE SUBMITTED WITH BID)

IFB-24095
Roof Replacement at
Mt. Washington School #221

I HEREBY CERTIFY that I am the _____and the duly authorized

representative of _____

whose address is _____ and

THAT NEITHER I nor, to the best of my knowledge, information, and belief, the above firm nor any of its other representatives I here represent:

(a) Have agreed, conspired, connived or colluded to produce a deceptive show of competition in the compilation of the bid or offer being submitted herewith;

(b) Have in any manner, directly or indirectly, entered into any agreement, participated in any collusion to fix the bid price or price proposal of the bidder or offeror herein or any competitor, or otherwise taken any action in restraint of free competitive bidding in connection with the Contract for which the within bid or offer is submitted.

In making this affidavit, I represent that I have personal knowledge of the matters and facts herein stated.

_____ _____
(SIGNATURE) (DATE)

_____
PRINTED OR TYPED NAME)

Subscribed and sworn before me this _____ day of _____, 20___.

x_____ Notary Public

My commission expires: _____

DEBARMENT AFFIDAVIT
(TO BE SUBMITTED WITH BID)
IFB-24095
Roof Replacement at
Mt. Washington School #221

_____ , being first duly sworn deposes and says that he is an officer in the _____ and the party making a certain proposal or bid dated, _____20___, to the Board of School Commissioners for Baltimore City Public Schools:

I further affirm that: Neither I, nor to the best of my knowledge, information, and belief, the above business, or any of its officers, directors, partners, or any of its employees directly involved in obtaining or performing contracts with public bodies, has ever been suspended or debarred (including being issued a limited denial of participation) by any public entity, except as follows (list each debarment or suspension providing the dates of the suspension or debarment, the name of the public entity and the status of the proceedings, the name(s) of the person(s) involved and their current positions and responsibilities with the business, the grounds of the debarment or suspension, and the details of each person's involvement in any activity that formed the grounds of the debarment or suspension):

_____

_____

I further affirm that:
(1) The business was not established and it does not operate in a manner designed to evade the application of or defeat the purpose of debarment pursuant to Sections 16-101, et seq., of the State Finance and Procurement Article of the Annotated Code of Maryland; and
(2) The business is not a successor, assignee, subsidiary, or affiliate of a suspended or debarred business, except as follows (you must indicate the reasons why the affirmations cannot be given without qualification):

_____

_____

Signature of:

x_____
Bidder, if the bidder is an individual

x_____
Officer, if the bidder is a corporation

x_____
Partner, if the bidder is a partnership

Subscribed and sworn before me this _____ day of _____, 20___.

x_____ Notary Public

My commission expires: _____

ANTI-BRIBERY AFFIDAVIT
(TO BE SUBMITTED WITH BID)

IFB-24095
Roof Replacement at
Mt. Washington School #221

_____, being first duly sworn deposes and says that he is an officer in the organization known as _____and the party making a certain proposal or bid dated, _____20___, to the Board of School Commissioners for Baltimore City Public Schools:

I further confirm that: Neither I, nor to the best of my knowledge, information, and belief, the above business (as in defined in Section 16-101(b) of the State Finance and Procurement Article of the Annotated Code of Maryland), or any of its officers, directors, partners, or any of its employees directly involved in obtaining or performing contracts with public bodies (as is defined in Section 16-101(f) of the State Finance and Procurement Article of the Annotated Code of Maryland), has been convicted of bribery, attempted bribery, or conspiracy to bribe in violation of Maryland Law, or of the law of any other state or federal law, except as follows (indicate the reasons why the affirmation cannot be given and list any conviction, plea, or imposition of probation before judgment with the date, court or administrative body, sentence or disposition, the name(s) of person(s) involved, and their current positions and responsibilities with the business):

_____

_____

_____

Signature of:
x_____
Bidder, if the bidder is an individual
x_____
Partner, if the bidder is a partnership
x_____
Officer, if the bidder is a corporation

Subscribed and sworn before me this _____ day of _____, 20___.

x_____ Notary Public

My commission expires: _____

PREQUALIFICATION CERTIFICATION AFFIDAVIT
(TO BE SUBMITTED WITH BID)

IFB-24095
Roof Replacement at
Mt. Washington School #221

_____ , being first duly sworn deposes and says that he/she is an officer for _____ ("Vendor") and the party making a certain proposal or bid dated _____20___, to the Baltimore City Board of School Commissioners for Baltimore City Public Schools:

I further affirm that: Vendor is prequalified with the Baltimore City Office of Boards and Commissions Review Committee ("Committee") in the amount of $_____and if awarded this contract, the contract dollar value, when added to Vendor's uncompleted backlog of all projects at the time of the bid due date, will not exceed the Committee's assigned work capacity rating, as shown on the accompanying "Calculation of Work Capacity as of Bid Due Date".

I further affirm that: The attached list of Vendor's uncompleted projects is a comprehensive list of uncompleted projects and is accurate as of the bid due date.

Signature of:

x_____
Bidder, if the bidder is an individual

x_____
Officer, if the bidder is a corporation

x_____
Partner, if the bidder is a partnership

Subscribed and sworn before me this _____ day of _____, 20___.

x_____ Notary Public

My commission expires: _____

Calculation of Work Capacity as of Bid Due Date

Project Name	Total Contract Amount including Change Orders	Amount Invoiced Through Bid Due Date	Uncompleted Backlog
Total			

Total Uncompleted Backlog	
IFB-24095 Bid Amount	
Total Uncompleted Backlog plus IFB-24095	
City of Baltimore Work Capacity Rating	
Work Capacity Surplus or Deficit	

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned _____

_____as Principal, and _____

_____as Surety, are hereby held and firmly bound unto the Baltimore City Board of School Commissioners and the Baltimore City Public Schools, as Owner, Two Percent (2%) of the Total Bid submitted for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, personal representatives, successors and assigns. Signed this_____day of _

_____, 19_____.

The condition of the above obligation is such that WHEREAS the Principal has submitted to the Baltimore City Board of School Commissioners and the Baltimore City Public Schools a certain Bid, attached hereto, and hereby made a part hereof to enter into a Contract, in writing, for the _____

_____

NOW, THEREFORE,

A. If said Bid shall be rejected or in the alternate.

B. If said Bid shall be accepted and the Principal shall execute and deliver a Contract in the form of Contract attached hereto (properly completed in accordance with said Bid), and shall furnish a bond for his faithful performance of said Contract, and for the payment of all persons performing labor or furnishing materials in connection therewith and shall in all other respects perform the Agreement created by the acceptance of said Bid.

Then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall in no event, exceed the penal amount of this obligation, as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by an extension of the time within which the Owner may accept such Bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their Hand and Seals, and such of them as are Corporation have caused their Corporate Seals to be hereto affixed and these presents to be signed by their proper Officers, the day and year first set forth above.

ATTEST: PRINCIPAL

_____ _____

_____

_____

ATTEST: SURETY

_____

_____

CERTIFICATE OF INSURANCE COVERAGE

Contractor shall submit with their response a Certificate of Insurance that complies with §19-116 of the Insurance Article, Maryland Annotated Code. The Baltimore City Board of School Commissioners should be named as Additional Insured on Contractor Insurance and named as Certificate Holder. Contractor's insurance shall be effective at time of Contractor's response. If the Certificate of Insurance contains a minor irregularity, the Contractor will be allowed five (5) business days to cure the minor irregularity or be determined non-responsive. The Insurance Certificate shall meet the following required insurance coverage:

1. Commercial General Liability Insurance at limits of not less than One Million Dollars ($1,000,000) per occurrence for claims arising out of bodily injuries or death, and property damages, subject to a minimum limit of Three Million Dollars ($3,000,000) aggregate. Such insurance shall include contractual liability insurance.

2. Business Automobile Liability at limits of not less than One Million Dollars ($1,000,000) per occurrence for all claims arising out of bodily injuries or death and property damages. The insurance shall apply to any owned, non-owned, leased, or hired automobiles used in the performance of this Agreement.

3. Workers' Compensation coverage as required by the State of Maryland, as well as any similar coverage required for this work by applicable Federal or "Other States" State Law.

The City, the Board, and their respective elected/appointed officials, employees, departments, agencies, agents and volunteers shall be covered, by endorsement, as additional insureds as respect to liability arising out of activities performed or to be performed by or on behalf of the Contractor in connection with this Agreement.

The Contractor's insurance shall apply separately to each insured against whom a claim is made and/or lawsuit brought.

The Contractor's insurance coverage shall be primary. Any insurance and/or self-insured program maintained by the City or the Board and their respective elected/appointed, officials, employees, departments, agencies, agents and volunteers, shall not contribute with the Contractor's insurance or benefit the Contractor in any way.
The Contractor acknowledges that it is not entitled to any sovereign immunity rights and protections that may be available to the City or the Board pursuant to § 5-518, Cts. & Jud. Proc., Md. Code.

Coverage shall not be suspended, voided, canceled, reduced in coverage or in limits, except by the reduction of the applicable aggregate limit by claims paid, until after forty-five (45) days prior written notice has been given to the City and the

Board. There will be an exception for non- payment of premium, which is ten (10) days' notice of cancellation.

Insurance is to be placed with insurers with a Best's rating of no less than A: VII, or, if not rated with Best's with minimum surpluses the equivalent of Bests' surplus size VII and must be licensed/approved to do business in the State of Maryland.

The Contractor shall furnish the City and the Board's Director of Materials, a "Certificate of Insurance" with a copy of the additional insured endorsement as verification that coverage is in force prior to the commencement of services to be rendered under the terms of this Agreement. Insurance coverage must be maintained throughout the life of the contract. The City and the Board reserve the right to require complete copies of Insurance policies at any time.

Failure to obtain insurance coverage as required or failure to furnish Certificate(s) of Insurance as required may render this Agreement null and void; provided, however, that no act or omission of the City or the Board shall in any way limit modify or affect the obligations of Contractor under any provision of this Agreement.

Current Copy of the Baltimore City Contractor's and Subcontractor's Prequalification Certificates

Contractor Qualifications Verification Response

This Document shall be submitted as a part of the Contractor's Response Package.

Company known as _____
party making a certain proposal or bid dated,__20___, to the Board of School Commissioners for the Baltimore City Public Schools.

I further affirm that: The above business shall self-perform the majority (>51%) of the work, shown on the contract drawings with their own forces; this percentage of the work **may not** be subcontracted. If, at any point during the project it is determined by City Schools that this percentage will not be met, it is grounds for immediate contract termination.

I further affirm that: The information provided in the document below is complete and accurate to the best of my knowledge and that this information will be used by City Schools to determine the responsiveness of the apparent low bidder. Incorrect or incomplete information will be cause for City Schools to deem the apparent low bidder as unresponsive, thereby disqualifying the bidder

Office Address:_____
_____
_____

Additional Location:_____
_____

_____

Signature of:

x_____
Bidder, if the bidder is an individual

x_____
Partner, if the bidder is a partnership

x_____ Maryland Contractor No._____
Officer, if the bidder is a corporation

Subscribed and sworn before me this_____day of_____, 20_____

x_____
Notary Public

My commission expires _____

PROJECT EXPERIENCE

_____, being first duly sworn deposes and says that he is an officer in the building construction organization known as_____ _____and the party making a certain proposal or bid dated, _____20_____, to the Board of School Commissioners for the Baltimore City Public Schools.

I further affirm that:

A. How many years has your organization been in business? _____

B. How many years has your organization been in business under its present _____

C. Under what other or former names has your organization operated?

_____

_____

_____

I further affirm that: The above business has successfully completed, in the role of General Contractor, a minimum of 3 projects of similar size, scope and duration in a public school within the past five years. Respondent shall provide a resume indicating the above-required project experience and at least two references pertaining to this experience.

Examples must be provided below.

1. **Project Name**

_____

Project Address _____ City _____ State _____

Project Owner Contact _____ Phone Number _____

Date of Project Completion _____

Size of Project_____ Dollar Value _____

2. Project Name

_____

Project Address City State

_____ _____ _____

Project Owner Contact Phone Number

_____ _____

Date of Project Completion _____

Size of Project_____ Dollar Value _____

3. Project Name

_____

Project Address City State

_____ _____ _____

Project Owner Contact Phone Number

_____ _____

Date of Project Completion _____

Size of Project_____ Dollar Value _____

Warranty Term_____

Signature of:
Bidder, if the bidder is an individual

x_____
Partner, if the bidder is a partnership

x_____ Maryland Contractor No._____
Officer, is the bidder is a corporation

Subscribed and sworn before me this___day of_____, 20___.

x_____Notary Public

My commission expires: _____

Bidders shall submit the following with their bid response:

1. **State of Maryland Contractor's License**

2. **Completed W-9 available at: www.irs.gov/pub/irs-pdf/fw9.pdf**

3. **Copies of your firm's Lead-Based Paint Certification, Renovator Certification and worker training records**

4. **State of Maryland Certificate of Good Standing or other filing verifying the bidder is in Good Standing with the Department of Assessments and Taxation of Maryland (Copy).**

   Bidder shall submit a State of Maryland Certificate of Good Standing or other State of Maryland issued documentation verifying the Contractor is in good standing with the Maryland Department of Assessment and Taxation and/or registered to do business in the State of Maryland.

   The Maryland Certificate of Good Standing should be issued in the calendar year of the proposal release date or sixty (60) days prior to the bid due date.

   If the Certificate of Good Standing contains a minor irregularity, the Contractor will be allowed five (5) business days to cure it or be determined to be non-responsive.

   Certificates of Status may be obtained on line at http://www.dat.state.md.us.

   This requirement applies to both Domestic and Foreign (out of state) Bidders. Foreign entities should contact the State Department of Assessments and Taxation, 301 West Preston Street, Baltimore, Maryland 21201 at 888-246-5941, to determine and apply for the appropriate documentation.

CONTRACT NO.

EXECUTIVE ORDER

WHEREAS, the Mayor and City Council of Baltimore ("City") is committed to promoting the well-being and positive development of the City's youth and providing educational and enrichment opportunities which will lead to academic improvement, safer environments and a reduction in high risk behavior; and

WHEREAS, Baltimore City has an estimated 76,000 citizens between the ages of 14-21, and

WHEREAS, the federal government ceased funding summer job programs for youth in 2000 after 25 years, causing local and state governments to join with businesses, philanthropic, faith-based, community, and educational organizations to obtain grants, tax-deductible donations and job opportunities to help these deserving youth; and

WHEREAS, the City and the Mayor's Office. of Employment Development ("MOED") have established the Baltimore City's YouthWorks program to prepare dependable Baltimore City high school and college students for productive employment that meets the workforce needs of local businesses; and

WHEREAS, 1he City wishes to encourage all local businesses and contractors, service providers, contractors and vendors, etc. doing business with the City to employ skilled and qualified Baltimore City youth between the ages of 14-21, who meet the job-ready status, as defined by 'Baltimore City's Youth Works program, during the summer of 2008; and

WHEREAS, the need to help Baltimore City's youth has never been greater

NOW, THEREFORE, I Sheila Dixon, Mayor of the City of Baltimore, by virtue of the authority vested in me by the Baltimore City Charter. do hereby promulgate the following EXECUTIVE ORDER:

1. Hencefor1h, each and every Solicitation from every City Department, Agency and Office, where the Bid is expected to be $25,000 or more, shall contain the attached form. Each and every Bidder shall provide the City with the (a) name, (b) complete address, (c) telephone number and (d) a contact person to assist MOED with the YouthWorks program.

2. MOED shall contact each and every business identified in §1 above and request that the business, contractor, service provider, contractor and vendor, etc. join with the City in reaching its goal of employing Baltimore City's YonthWorks referrals, or otherwise assist the Baltimore City's YouthWorks program.

3. MOED shall establish and maintain an ongoing relationship with City businesses, contractors, service providers, contractors and vendors, etc. in an effort to address their current and future employment and/or training needs.

4. This Executive Order shall take effect immediately.

IN WITNESS HEREOF, I HAVE PLACED MY HAND AND THE GREAT SEAL OF THE CITY OF BALTIMORE THIS 14th DAY OF JANUARY 2008

{SIGNED} SHEILA DIXON, MAYOR

RESOLUTION OF THE BOARD OF ESTIMATES APPRENTICESHIP

TRAINING PROGRAMS

WHEREAS, the Mayor and City Council of Baltimore, acting by and through the Board of Estimates, pursuant to Article VI, Section 4 of the Charter of Baltimore City, 1964 Revision, as amended, is responsible for awarding contracts and supervising all purchasing by the City; and,

WHEREAS, the Board of Estimates wishes to ensure that all prime contractors performing under any City construction contract conduct apprenticeship training programs as a condition of their contracts;

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF ESTIMATES OF BALTIMORE CITY, that the following policy applies to all prime contractors performing under any construction contract of the City that has a total cost of $1,000,000.00 or more:

1. Prime Contractors shall conduct apprenticeship training programs as a condition of their contracts.
2. Prime Contractors shall submit to the contract administrator for the City agency supervising the contract, within ten days of their receipt of notice of award of each contract, evidence of its participation in a certified apprenticeship program that has been previously approved by the contract administrator, or an apprenticeship training action plan for approval by the contract administrator. Prime Contractors will further submit, from time to time as requested by the contract administrator, evidence of and statistics concerning the apprenticeship training actually performed by the Prime Contractors in connection with each City contract.
3. If the Board of Estimates determines that a Prime Contractor has violated the policy set forth in this Resolution, then the Prime Contractor may be disqualified from bidding on future City contracts or may be found in default of its existing contract.
4. A copy of this Resolution must be included in all City contracts.
5. This Resolution applies to all City Contracts entered into after the date of its approval by the Board of Estimates.
7. This Resolution takes effect immediately.

CONTRACT NO.

C. BALTIMORE APPRENTICESHIP TRAINING PROGRAM

MAYOR AND CITY COUNCIL OF BALTIMORE, MARYLAND

THE BALTIMORE APPRENTICE TRAINEE PROGRAM (BATP)

BID FORM

Contracting Agency _____

Contract (Project Title) _____

Scheduled Bid Due Date _____

APPRENTICE TRAINEE FORM IS DUE WITH THE BID.

FOR MORE INFORMATION ABOUT THIS FORM OR ASSISTANCE, CONTACT:

Minority and Women's Business Opportunity Office (MWBOO)
100 N. Holliday Street, Rm. 101
Baltimore, MD 21202
(410) 396-4355

MWBOO (12/00)

MAYOR AND CITY COUNCIL OF BALTIMORE, MARYLAND
BALTIMORE APPRENTICE TRAINEE PROGRAM (BATP)

PART I.

The City of Baltimore has established an apprentice training program which requires all bidders on City construction projects over $1,000,000.00 to participate in a program certified by the State of Maryland.

Training and upgrading minorities and women toward journeyperson status is the primary objective of this training provision. The purpose for this objective is to insure a pool of qualified minorities and women to replace those who, in the natural course of events, leave the workforce.

The Bidder shall commit to make its best effort to meet the BATP requirements outlined in these contract documents. If awarded this contract, the Bidder shall notify each firm with which they intend to contract of the BATP requirements and make these requirements a material part of the subcontract where appropriate.

The bidder hereby designates:

Name: _____

Title: _____

Phone: _____

as the person who has been designated with the responsibility for carrying out and reporting compliance with this program.

1. Bidders shall make their best effort to comply with the BAT Program requirements outlined in these solicitation documents. Failure to comply with these requirements shall be considered a material breach of this contract and grounds for termination.

2. The Contractor shall submit a plan for apprentice participation with the construction schedule to the contracting agency. The agency engineer shall designate the number of trainees, hours to be utilized, and the area in which the trainees are required.

   A. The draft construction schedule submitted to the contracting agency shall include a copy of the state certified apprentice/OJT program in which the Bidder is participating, required labor resources by trade in order to determine the availability of apprentice opportunities, and a trade breakdown of anticipated participation by apprentices. The construction schedule and any updates shall include apprentice participation by trade.

   B. Apprentice participation shall be distributed throughout each technical discipline or trade designated by the engineer.

   C. The contracting agency will review and approve the apprenticeship participation plan and forward a copy of the approved plan to MWBOO.

   D. Goals for trainees will be based on the Contractor's current utilization (Exhibit I in the contract document) and the availability of minorities and females in specified trade areas as indicated in the publication of the Maryland Department of Labor, Licensing and Regulation, Office of Labor Market Analysis and Information.

   E. The specific efforts proposed by the Contractor or its subcontractors if additional efforts are required to implement the BAT Program.

   F. The Contractor shall submit a BAT Program Report (AA2A) and a written projection for the following month of apprentice hourly participation by trade with each progress payment request.

   G. BAT Program participation plans shall apply to all change orders and extra work orders.

   H. Requests for modifications or amendments of the contractors must be submitted to the contracting agency with copies to MWBOO.

   The Contractor will receive a written response to the request.

CONTRACT NO.

PART II AFFIDAVIT

The undersigned, being first duly sworn on oath states to the City of Baltimore on behalf of the bidder as follows:

1. The Bidder ensures that it will provide opportunities for the training and employment of minorities and women in apprenticeship and other positions with the bidder, subcontractors, or employed on the project.

2. The Bidder agrees that it will make every effort to comply with the BAT Program.

3. Bidders shall maintain records in an easily retrievable and understandable format that documents any and all openings and/or opportunities for apprentice/trainees and where appropriate, make these requirements a part of all subcontract agreements on this project.

4. Bidder acknowledges that any bid which fails to include this duly executed and notarized form with the M/WBE portion of the bid documents may be declared as non-responsive by the Baltimore City Board of Estimates.

5. The bidder agrees to submit all forms as required in Part I& III of this document.

_____ _____

Name of Bidder Name of Project Contract

By _____

Title _____ Date _____

I hereby certify that on this_____day of _____ 20_, before me the subscriber,

a Notary Public of the State of_____in and for _____

_____City or County, personally appeared _____

_____who acknowledged himself-herself to be the (title)

_____of (company) _____

and being duly authorized, executed the foregoing affidavit for the purposes and uses therein contained.

_____
Signature of Notary Public

_____(SEAL)
My Appointment Expires

THE BALTIMORE APPRENTICE TRAINEE PROGRAM (BATP)

INSTRUCTIONS

Part III

I. Advertisement for Construction Bids (Contracting Agency)

All bid advertisements for construction projects with an estimated cost of $1,000,000.00 or more shall include the following language:

"The City of Baltimore has established an apprentice participation program requirement for this contract."

II. Bid Documents

All bid documents where the cost of the bid is estimated to be $1,000,000.00 or more shall include the BATP BID FORM unless otherwise determined by the agency engineer.

The BATP Bid Form must be submitted with the bid.

III. Pre-Bid Conference

If there is a pre-bid conference, an MWBOO Compliance Representative shall be present to discuss the BAT Program.

IV. The following forms must be submitted as indicated:

A. The Plan for Apprenticeship Participation must be completed and submitted for each area of training designated by the agency engineer before the notice to proceed is issued.

B. The Maryland Apprenticeship Agreement forms must be submitted with each progress payment request to the contracting agency or as new trainees are hired.

C. With each progress payment request, the prime contractor must submit the MWBOO AA2 and AA2A to the contracting agency.

D. If an apprentice is terminated, the contracting agency shall be informed within 10 working days. A new Apprentice Agreement Form for the replacement trainee should be attached.

E. MWBOO forms AAl and IA shall be submitted to the contracting agency semi-annually on June 30th and December 31st of each year.

ATTACHMENT

V. Penalties and Sanctions

A. A determination by the Board of Estimates after recommendation by the Minority and Women's Business Opportunity Office (MWBOO) that the Contractor has failed to comply with any portion of the BATP rules described in this solicitation, or its approved apprenticeship plan, shall subject the offending party to any or all of the following:

1. Suspension of Contract
2. Withholding of Funds
3. Rescission of contract based upon a material breach of contract
4. Disqualification of a bidder, contractor for a period of not to exceed two years
5. Payment of Liquidated Damages

B. Violation/Disqualification:

It is a violation of this program to:

1. Willfully falsify, conceal, or cover up by a trick, scheme, or device a material fact, or make any false, fictitious or fraudulent statements or representations or make use of any false, fictitious or fraudulent statement or entry.

2. Willfully obstruct, impede, or attempt to obstruct or impede any authorized official or employee who is investigating the validity of any activity under the BATP.

Mayor’s Office of Employment & Development

The Mayor's Office of Employment Development provides businesses with a pipeline of qualified, skilled job candidates and supports businesses in retaining and developing their employees. We offer customized workforce solutions including outreach and recruitment, applicant prescreening, assessment and testing services, tax credit information, human resources support and training funds for new or existing employees. Training funds are available through several programs.

Customized Training is a business-driven program that helps companies train and hire people to fit their job-specific needs. Business Services recruits and pre-screens training applicants. The available positions must be full-time and meet minimum salary requirements. Companies accepting Customized Training grants must agree to hire successful participants. The training can be employer-based, on-the-job, or offered by qualified vendors.

Maryland Business Works enables small businesses and/or companies in high-growth industries to upgrade the skills of their existing employees. Businesses can access up to $25,000 to support their staff development needs. This incumbent worker funding encourages promotion, creates additional job opportunities and improves worker retention by increasing employee skill levels. Funding is limited and is available on a first-come, first-served basis.

MOED works closely with other local, state and federal agencies to promote the link between the city's workforce and economic development initiatives.

For Further Information Contact:
Rosalind Howard or Susan Tagliaferro
Baltimore City Residents First
Mayor's Office of Employment Development
3001 East Madison Street Baltimore, Maryland 21205
Phone 443-984-3014. • Fax 410-361-9648
rhoward@moedworks.com stagliaferro@moedworks.com
-or- BCRF@moedworks.com

BALTIMORE CITY'S YOUTHWORKS
(TO BE SUBMITTED WITH BID)

IFB-24095
Roof Replacement at
Mt. Washington School #221

TO: Mayor's Office of Employment Development ("MOED")

FROM: _____
(Legal name of Bidder)

Pursuant to Executive Order, the aforesaid bidder hereby presents MOED with the following information to assist its outreach for the Baltimore City YouthWorks Program:

Contact Person: _____

Address: _____

_____

Telephone Number: _____

Facsimile Number: _____

E-mail address: _____

Baltimore City's YouthWorks summer jobs program gives Baltimore city teens and young adults between the ages of 14 and 21 real-world work experiences that expose them to career options and pathways, prepare them to success entering the labor market and develop essential skills such as basic workplace etiquette and teamwork. For additional information about the program, call 410-396-5627 or visit the website https://youthworks.oedworks.com/.

IAC/PSCP Form 306.4

CERTIFIED MINORITY BUSINESS ENTERPRISE PARTICIPATION
STANDARD MONTHLY CONTRACTOR'S REQUISITION FOR PAYMENT

LEA: _____ **DATE:** _____

FACILITY NAME: _____ **PSC NO:** _____

SCOPE OF WORK: _____ **REQ NO:** _____

Name of MBE Sub-Contractor	MDOT Certification Number and Classification	TOTAL MBE Contract Amount	Amount to be Paid THIS Requisition	TOTAL Paid to Date	MBE has Received FINAL Payment?	If amount paid is LESS than TOTAL MBE Contract Amount, EXPLAIN VARIANCE
	TOTAL:	**$ -**	**$ -**	**$ -**		

MDOT Certification Number and Classification can be located at http://mbe.state.mdot.state.md.us/directory/

MBE Classification:

African American = AA
Hispanic American = H
Native American = N
Asian American = A
Women = W
African American/Women = AAW
Hispanic American/Women = HW
Native American/Women = NW
Asian American/Women = AW

I certify that the figures and information presented above represent accurate and true statements, that timely payments have been and will be made to suppliers and subcontractors on this project as requisitioned payments are received, and in accordance with our contracts.

_____ _____

Name of Contractor Firm | Authorized Contractor Signature/Date

_____

Contractor Federal Tax ID #

Contractor MBE Classification # (if applicable)

Name of LEA MBE Liaison

Signature of LEA MBE Liaison/Date

IAC/PSCP Form 306.4

CERTIFIED MINORITY BUSINESS ENTERPRISE PARTICIPATION STANDARD MONTHLY CONTRACTOR'S REQUISITION FOR PAYMENT

Instructions for Completion of IAC/PSCP Form 306.4

THIS FORM TO BE COMPLETED BY PRIME CONTRACTOR ONLY

1. **LEA** – Enter full name of LEA.
2. **Facility Name** – Enter full name of school/facility.
3. **Scope of Work** – Enter type of work being performed (i.e. New, Renovation, Roof, HVAC, ASP – Flooring, QZAB – Media Center, etc.).
4. **Date** – Date of Requisition.
5. **PSC NO** – Enter full PSC Number as assigned by PSCP.
6. **REQ NO** – Enter the number of the corresponding Requisition for Payment.
7. **Name of MBE Sub-Contractor** – Enter full name of MBE Sub-Contractor.
8. **MDOT Certification Number & Classification** – Enter the 5 digit MDOT Certification number and corresponding MDOT Classification for each MBE Sub-Contractor. MDOT Classifications and the MDOT website are listed at the bottom of this form.
9. **TOTAL MBE Contract Amount** – Enter ORIGINAL Total MBE Contract Amount as stated on MBE Attachments B and D. This amount should NOT be altered with change order amounts, changes to scope of work, etc. which may affect contract amount.
10. **Amount to be Paid This Requisition** – Enter the amount to be paid to the MBE Sub-Contractor for work applicable to this requisition.
11. **TOTAL Paid to Date** – Enter the TOTAL amount paid to date to the MBE Sub-Contractor – this amount should NOT include the amount being paid on this requisition, only the total of prior payments.
12. **MBE has Received FINAL Payment** – Enter "YES" if the MBE Sub-Contractor has been paid in full. Enter "NO" if the MBE Sub-Contractor has NOT been paid in full.
13. **If amount paid is LESS than TOTAL MBE Contract Amount, EXPLAIN VARIANCE** – Enter a brief reason for the MBE Sub-Contractor NOT being paid equal to or greater than the ORIGINAL Total MBE Contract Amount as stated on this form and MBE Attachments B & D. Additional documentation may be required to be submitted for variance explanations.
14. **Name of Contractor Firm** – Enter full name of Prime Contractor.
15. **Authorized Contractor Signature/Date** – The authorized individual employed by the Prime Contractor who filled this form out should date and sign here.
16. **Contractor Federal Tax ID #** – Enter the Federal Tax ID Number of the Prime Contractor.
17. **Contractor MBE Classification #** - Enter the MDOT MBE Classification Number if the Prime Contractor is a MDOT certified MBE Company.
18. **Name of LEA MBE Liaison** – PRINT the name of the LEA MBE Liaison (or other LEA authorized employee) responsible for VERIFYING ALL INFORMATION filled out by the Prime Contractor on this form.
19. **Signature of LEA MBE Liaison/Date** – Signature of the person VERIFYING ALL INFORMATION filled out by the Prime Contractor on this form (signature of person stated in Step #18.)

PERFORMANCE BOND

Principal	Business Address of Principal
Surety a Corporation of the State of _____ and authorized to do business in the State of Maryland	Obligee Baltimore City Board of School Commissioners and The Mayor and City Council of Baltimore
Sum of Bond (Equal to Contract Price SUM OF _____ Dollars ($_____)	
Contract Number and Identification **CONTRACT NO.** **TITLE AND LOCATION**	Date of Contract _____ 20 _____ _____ Date Bond Executed _____ 20 _____

KNOW ALL MEN BY THESE PRESENTS, That we, the PRINCIPAL above named and SURETY above named, are held and firmly bound unto the OBLIGEE above named in the full and just sum of the amount stated above, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, personal representatives, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the PRINCIPAL is entering into a certain Contract with the OBLIGEE described and dated, as shown above and attached hereto, and is required under the Provisions of the Public General Laws of Maryland to give a bond conditioned as hereinafter set forth.

NOW THEREFORE, if the PRINCIPAL shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of said Contract during the original term of said Contract and any extensions thereof that may be granted by the OBLIGEE, with or without notice to the SURETY, and during the term or terms of any maintenance, repair, guaranty and warranty required under the Contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modifications to the SURETY being hereby waived, and shall indemnify and save harmless the Baltimore City Board of School Commissioners, the Baltimore City Public Schools and the Mayor and City Council of Baltimore, their agents and

employees against and from all costs, expenses, damages, injury or loss to which the said Baltimore City Board of School Commissioners and/or the Baltimore City Public Schools, its agents and employees, may be subjected by reason of any wrongdoing, misconduct, want of care or skill, negligence or default on the part of said PRINCIPAL, its agents or employees, or in any manner arising directly or indirectly from any and all causes whatsoever, in or about the execution or performance of the Contract, during the Original term of said Contract and/or any authorized extension or modification thereof and/or during the term or terms of any maintenance, repair, guaranty and warranty required under the Contract, then this obligation shall be null and void; otherwise to remain in full force and effect.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the OBLIGEE, or the successors or assigns of OBLIGEE.

IN WITNESS WHEREOF, the above bounded parties have executed this instrument under their several Seals on the date indicated above, the Name and corporation seal of each corporate party being hereto affixed, and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

ATTEST: as to principal

SIGNATURE	SIGNATURE
PRINT NAME	PRINT NAME AND TITLE (SEAL)

ATTEST: as to surety

SIGNATURE	SIGNATURE
PRINT NAME	PRINT NAME AND TITLE (SEAL)

AGENT (COMPANY): _____

AUTHORIZED BY (NAME AND TITLE): _____

PAYMENT BOND

Principal	Business Address of Principal
Surety a Corporation of the State of _____ and authorized to do business in the State of Maryland	Obligee Baltimore City Board of School Commissioners, the Baltimore City Public Schools and The Mayor and City Council of Baltimore

Sum of Bond (Equal to Contract Price)

SUM OF _____ Dollars
($)_____

Contract Number and Identification **CONTRACT NO** **TITLE AND LOCATION**	Date of Contract _____20 _____ _____ Date Bond Executed _____20 _____

KNOW ALL MEN BY THESE PRESENTS That we, the PRINCIPAL above named and SURETY above named, are held and firmly bound unto the OBLIGEE above named in the full and just sum of the amount stated above, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, personal representatives, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the PRINCIPAL is entering into a certain Contract with the Obligee described and dated, as shown above and attached hereto, and is required under the Provisions of the Public General Laws of Maryland to give bond conditioned as hereinafter set forth.

NOW, THEREFORE, the condition of this obligation is such that if the PRINCIPAL shall promptly make payments to all persons supplying labor and/or material in the prosecution of the work provided for in said Contract and any and all duly authorized extensions and/or modifications of said Contract that may hereafter be made, notice of such extensions and/or modifications to the SURETY being hereby waived, and any maintenance, repair, guaranty and warranty required under the Contract, then this obligation to be null and void: otherwise to remain in full force and effect.

A suit or action commenced hereunder shall comply with applicable Provisions of the Public General Laws of Maryland. No suit or action shall be commenced hereunder against the OBLIGEE, its successors or assigns, nor shall OBLIGEE be liable for any costs or expenses of such suit.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several Seals on the date indicated above, the Name and corporate seal of each corporate party being hereto affixed, and these presents duly signed by its undersigned Representative, pursuant to authority of its governing body.

ATTEST: as to principal

SIGNATURE	SIGNATURE
PRINT NAME	PRINT NAME AND TITLE (SEAL)

ATTEST: as to surety

SIGNATURE	SIGNATURE
PRINT NAME	PRINT NAME AND TITLE (SEAL)

AGENT (COMPANY): _____

AUTHORIZED: _____
NAME AND TITLE

BALTIMORE CITY PUBLIC SCHOOLS

Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

1801 Sulgrave Ave.
Baltimore, Maryland 21209

PROJECT MANUAL

100% CONSTRUCTION DOCUMENTS SUBMISSION
12/29/2023

Prepared by:

MICHAEL GRAVES ARCHITECTURE
MGA Project No: WMD-23034-00

MEP ENGINEER
SETTY& ASSOCIATES INT., PLLC.

STRUCTURAL ENGINEER
LEUTERIO THOMAS, LLC

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SECTION 000101 - PROJECT TITLE PAGE

1.1 PROJECT MANUAL VOLUME 1

A. Mount Washington School #221 Roof Replacement

B. Baltimore City Public Schools

C. 1801 Sulgrave Avenue, Baltimore, MD 21209

D. Owner Project No. PSC#: 30.268.21/23

E. Architect Project No. WMD-23034-00

F. Michael Graves Architecture

G. 6325 Woodside Ct, Columbia, MD 21046
Phone:(410) 290-9680

H. Issued: 12/08/2023

END OF DOCUMENT 000101

SECTION 000102 - LIST OF DRAWING SHEETS

#	SHEET #	SHEET NAME
1	G-001	COVER SHEET
2	A-001	CODE ANALYSIS, GENERAL NOTES AND LEGENDS
3	A-002	AREA PLANS
4	A-003	3D VIEWS
5	A-010	PHOTO PLAN - AREA A1
6	A-011	PHOTO PLAN - AREA A2
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8	AD-101	DEMOLITION PLAN AREA A1
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17	A-501	DETAILS
18	A-502	DETAILS
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20	S-001	GENERAL NOTES
21	S-100	OVERALL ROOF FRAMING PLAN
22	S-101	ENLARGED ROOF FRAMING PLAN AREA A1
23	S-102	ENLARGED ROOF FRAMING PLAN AREA A2
24	S-501	TYPICAL DETAILS
25	M-001	GENERAL NOTES, SYMBOLS & ABBREVIATIONS
26	MD-100	THIRD FLOOR PLAN - MECHANICAL DEMOLITION
27	MD-101	ROOF PLAN - MECHANICAL DEMOLITION AREA A1
28	MD-102	ROOF PLAN - MECHANICAL DEMOLITION AREA A2
29	M-100	THIRD FLOOR PLAN - MECHANICAL NEW WORK
30	M-101	ROOF PLAN - MECHANICAL DUCTWORK AREA A1
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32	M-701	MECHANICAL DETAILS
33	P-001	GENERAL NOTES, SYMBOLS & ABBREVIATIONS
34	PD-101	ROOF PLAN - PLUMBING DEMOLITION AREA A1
35	PD-102	ROOF PLAN - PLUMBING DEMOLITION AREA A2
36	P-101	ROOF PLAN - PLUMBING NEW WORK AREA A1
37	P-102	ROOF PLAN - PLUMBING NEW WORK AREA A2
38	P-701	PLUMBING DETAILS
39	E-001	GENERAL NOTES, SYMBOLS & ABBREVIATIONS

40	ED-101	ROOF PLAN - ELECTRICAL DEMOLITION AREA A1
41	ED-102	ROOF PLAN - ELECTRICAL DEMOLITION AREA A2
42	E-201	ROOF PLAN - ELECTRICAL NEW WORK AREA A1
43	E-202	ROOF PLAN - ELECTRICAL NEW WORK AREA A2
44	E-701	ELECTRICAL DETAILS
45	E-801	LIGHTNING PROTECTION PLAN
46	E-802	LIGHTNING PROTECTION DETAILS
47	E-803	LIGHTNING PROTECTION DETAILS

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Contractor's use of site and premises.
4. Coordination with occupants.
5. Work restrictions.
6. Specification and Drawing conventions.
7. Miscellaneous provisions.

1.3 DEFINITIONS

A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
1. This project is to replace the entire approximately 18,827 square foot roof for this building. The scope of work will replace the entire built up roof with a new 0.80 TPO roof, using tapered insulation for proposed 1/4" per foot slope as required. Insulation boards - flat and tapered - will be utilized to attain as much of the R-30 ci rating as possible to comply with IECC 2018. The roof replacement shall include all flashing and accessories, metalwork, new drains, and coping necessary. The roofing system will be covered by a minimum 20 year "Total System, No Dollar Limit" warranty. Curb and flashing will be coordinated. Roof drains, associated piping, and vandal proof strainers will be replaced. All gutters and downspouts will be replaced. Unless new, equipment on the roof will be replaced, including by not limited to gravity vents, exhaust fans (including electric), roof hatches, boiler and heater stacks. Existing roof access stairs and ladders are to be replaced. Due to the proximity of adjacent terrain and trees, new lightning protection shall be included in the base project scope.

1.5 CONTRACTOR'S USE OF SITE AND PREMISES

A. Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Limits on Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.6 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy Project site and existing building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.7 WORK RESTRICTIONS

A. Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.

4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.

C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings and published as part of the U.S. National CAD Standard.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.9 Miscellaneous Provisions

A. All work done by the contractor shall carry a warranty of minimum 2 years in addition to 20 year NDL (No dollar warranty) for the roof.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

1.3 DEFINITIONS

A. Unit price is an amount incorporated into the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, [applicable taxes,]overhead, and profit.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the Part 3 "Schedule of Unit Prices" Article contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price No. 1: Brick Repair .

1. Description: Repair existing exterior brick wall as mutually agreed upon by Owner and Contractor upon review of field conditions during construction time period.
2. Provide price per square foot based upon 500 S.F. of existing brick repair.

B. Unit Price No. 2: Masonry tuck-pointing

1. Description: Tuck-Point Brick Masonry as mutually agreed upon by Owner and Contractor upon review of field conditions during construction time period.
2. Unit of Measurement: Provide price per L.F. based upon 1000 L.F. of masonry tuck-pointing.

END OF SECTION

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. RFIs.
4. Digital project management procedures.
5. Web-based Project management software package.
6. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. BIM: Building Information Modeling.

B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in temporary field office,in web-based in prominent location in each built facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination of Multiple Contracts: Each contractor shall cooperate with Project coordinator, who shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the contracted results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractorsto avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
b. Coordinate the addition of trade-specific information to coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
f. Indicate required installation sequences.
g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
3. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
4. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
5. Mechanical and Plumbing Work: Show the following:

a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
c. Fire-rated enclosures around ductwork.

6. Electrical Work: Show the following:

a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.

c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
d. Location of pull boxes and junction boxes, dimensioned from column center lines.

7. Fire-Protection System: Show the following:

a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

8. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
9. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

1.7 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Owner name.
3. Owner's Project number.
4. Name of Architect and Construction Manager.
5. Architect's Project number.
6. Date.
7. Name of Contractor.
8. RFI number, numbered sequentially.
9. RFI subject.
10. Specification Section number and title and related paragraphs, as appropriate.
11. Drawing number and detail references, as appropriate.
12. Field dimensions and conditions, as appropriate.
13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
14. Contractor's signature.
15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

1. Attachments shall be electronic files in PDF format.

D. Architect's and Construction Manager's Action: Architect and Construction Manager will review each RFI, determine action required, and respond. Allow Ten days for Architect's response for each RFI. RFIs received by Architect or Construction Manager after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for approval of Contractor's means and methods.
d. Requests for coordination information already indicated in the Contract Documents.
e. Requests for adjustments in the Contract Time or the Contract Sum.
f. Requests for interpretation of Architect's actions on submittals.
g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager in writing within 5 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use software log that is part of web-based Project management software.

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number, including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Use of Architect's Digital Data Files: Digital data files of Architect's CAD drawings will be provided by Architect for Contractor's use during construction.

1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.

2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
3. Digital Drawing Software Program: Contract Drawings are available in Insert name and version of digital drawing software program and operating system.
4. Contractor shall execute a data licensing agreement in the form of AIA Document C106 Digital Data Licensing Agreement.

    a. Subcontractors and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of AIA Document C106.
5. The following digital data files will be furnished for each appropriate discipline:

    a. Floor plans.
    b. Reflected ceiling plans.

B. Web-Based Project Management Software Package: Use Architect's web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.

1. Web-based Project management software includes, at a minimum, the following features:

    a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
    b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
    c. Document workflow planning, allowing customization of workflow between project entities.
    d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
    e. Track status of each Project communication in real time, and log time and date when responses are provided.
    f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
    g. Processing and tracking of payment applications.
    h. Processing and tracking of contract modifications.
    i. Creating and distributing meeting minutes.
    j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
    k. Management of construction progress photographs.
    l. Mobile device compatibility, including smartphones and tablets.

2. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.
3. Provide the following Project management software packages under their current published licensing agreements:
    a. Newforma ConstructEx: www.newformaprojectcloud.com.

C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:

1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of 10 working days prior to meeting.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Contractor will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner , Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

a. Responsibilities and personnel assignments.
b. Tentative construction schedule.
c. Phasing.
d. Critical work sequencing and long lead items.
e. Designation of key personnel and their duties.
f. Lines of communications.
g. Use of web-based Project software.
h. Procedures for processing field decisions and Change Orders.
i. Procedures for RFIs.
j. Procedures for testing and inspecting.
k. Procedures for processing Applications for Payment.
l. Distribution of the Contract Documents.
m. Submittal procedures.
n. Sustainable design requirements.
o. Preparation of Record Documents.
p. Use of the premises and existing building.
q. Work restrictions.
r. Working hours.
s. Owner's occupancy requirements.
t. Responsibility for temporary facilities and controls.
u. Procedures for moisture and mold control.
v. Procedures for disruptions and shutdowns.
w. Construction waste management and recycling.
x. Parking availability.
y. Office, work, and storage areas.
z. Equipment deliveries and priorities.
aa. First aid.
bb. Security.
cc. Progress cleaning.

3. Minutes: Architect will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related RFIs.
    d. Related Change Orders.
    e. Purchases.
    f. Deliveries.
    g. Submittals.
    h. Sustainable design requirements.
    i. Review of mockups.
    j. Possible conflicts.
    k. Compatibility requirements.
    l. Time schedules.
    m. Weather limitations.
    n. Manufacturer's written instructions.
    o. Warranty requirements.
    p. Compatibility of materials.
    q. Acceptability of substrates.
    r. Temporary facilities and controls.
    s. Space and access limitations.
    t. Regulations of authorities having jurisdiction.
    u. Testing and inspecting requirements.
    v. Installation procedures.
    w. Coordination with other work.
    x. Required performance results.
    y. Protection of adjacent work.
    z. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Contractor will conduct progress meetings at regular intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and 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 meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present, including the following:

        1) Interface requirements.
        2) Sequence of operations.
        3) Resolution of BIM component conflicts.
        4) Status of submittals.
        5) Status of sustainable design documentation.
        6) Deliveries.
        7) Off-site fabrication.
        8) Access.
        9) Site use.
        10) Temporary facilities and controls.
        11) Progress cleaning.
        12) Quality and work standards.
        13) Status of correction of deficient items.
        14) Field observations.
        15) Status of RFIs.
        16) Status of Proposal Requests.
        17) Pending changes.
        18) Status of Change Orders.
        19) Pending claims and disputes.
        20) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

    a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

END OF SECTION

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's Construction Schedule.
2. Construction schedule updating reports.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time belongs to Owner.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file.
2. PDF file.

B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.

C. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
3. Total Float Report: List of activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.

D. Construction Schedule Updating Reports: Submit with Applications for Payment.

1.5 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

1.6 CPM SCHEDULE REQUIREMENTS

A. Prepare network diagrams using AON (activity-on-node) format.

B. CPM Schedule: Prepare Contractor's Construction Schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule, so it can be accepted for use no later than 60 days after date established for the Notice to Proceed.

a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.

C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

a. Preparation and processing of submittals.
b. Mobilization and demobilization.
c. Purchase of materials.
d. Delivery.
e. Fabrication.
f. Utility interruptions.
g. Installation.
h. Work by Owner that may affect or be affected by Contractor's activities.
i. Testing and inspection.
j. Commissioning.
k. Punch list and Final Completion.
l. Activities occurring following Final Completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.

a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
b. Total cost assigned to activities shall equal the total Contract Sum.

D. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.

E. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

G. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.

    a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
    b. Submit value summary printouts one week before each regularly scheduled progress meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

B. Related Requirements:

1. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
4. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
5. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
6. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal Category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled dates for purchasing.
    h. Scheduled date of fabrication.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.5 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of Construction Manager.
5. Name of Contractor.
6. Name of firm or entity that prepared submittal.
7. Names of subcontractor, manufacturer, and supplier.
8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
9. Category and type of submittal.
10. Submittal purpose and description.
11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
12. Drawing number and detail references, as appropriate.
13. Indication of full or partial submittal.
14. Location(s) where product is to be installed, as appropriate.
15. Other necessary identification.

16. Remarks.
17. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.

    a. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.

2. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.
3. Paper: Prepare submittals in paper form and deliver to Architect.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

    a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.7 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams that show factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Notation of dimensions established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Seal and signature of professional engineer if specified.

2. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.

C. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

E. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

F. Certificates:

1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.

6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

G. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.
    f. Test procedures and results.
    g. Limitations of use.

1.8 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.9 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

1. Architect [and Construction Manager] will not review submittals received from Contractor that do not have Contractor's review and approval.

1.10 ARCHITECT'S [AND CONSTRUCTION MANAGER'S] REVIEW

A. Action Submittals: Architect [and Construction Manager] will review each submittal, indicate corrections or revisions required, and return.

1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action, as follows:
   a. NO EXCEPTION TAKEN: The Work covered by the submittal is accepted as specified and the Work may proceed provided it complies with requirements of the Contract Documents.
   b. NOTE MARKINGS: The Work covered by the submittal is accepted as noted and the Work may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents.
   c. REVISE AND RESUBMIT: Do not proceed with the Work covered by the submittal. Revise or prepare a new submittal according to the notations and requirements of the Contract Documents, and resubmit without delay. Unmarked items may be fabricated if indicated.
   d. REJECTED: Architect will list reasons for rejection on the submittal or in the transmittal letter accompanying the submittal. Do not proceed with the Work covered by the submittal. Prepare new submittal according to the notations and requirements of the Contract Documents, and resubmit without delay.
   e. ACTION NOT REQUIRED: Either the submittal was not requested or the submittal was for information only or for record purposes.

2. Submittals by Web-Based Project Management Software: Architect will indicate, on Project management software website, the appropriate action.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Architect will discard submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by Architect without action.

END OF SECTION

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.

1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

D. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.

1. Mockups are used for one or more of the following:

a. Verify selections made under Sample submittals.

b. Demonstrate aesthetic effects.
c. Demonstrate the qualities of products and workmanship.
d. Demonstrate successful installation of interfaces between components and systems.
e. Perform preconstruction testing to determine system performance.

2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.

E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."

I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.4 DELEGATED DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicate, including strengthening requirement of existing supporting structure. Include list of codes, loads, and other factors used in performing these services.

1.5 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is the minimum provided or performed. 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 requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Contractor's quality-control personnel.

B. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
2. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

D. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.

1. Requirements of authorities having jurisdiction supersede requirements for specialists.

G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following Contractor's responsibilities, including the following:

1. Provide test specimens representative of proposed products and construction.
2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
3. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
4. Build site-assembled test assemblies and mockups, using installers who will perform same tasks for Project.
5. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.
6. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.

1.8 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Payment for these services will be made from testing and inspection allowances specified in Section 012100 "Allowances," as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Engage a qualified testing agency to perform quality-control services.

    a. Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.

1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
2. Distribution: Distribute schedule to Owner, Architect, Commissioning Authority, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless 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.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.

C. Copies of Standards: Each entity engaged in construction on Project should 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, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

A. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

B. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov/fdsys.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

C. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.govinfo.gov.

2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.

    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from General Services Administration; www.gsa.gov.
    c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.

6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

D. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program;www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/Pages/Main-Page.aspx.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservice.tamu.edu.

END OF SECTION

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Owner will pay sewer-service use charges for sewer usage by all entities for construction operations.

C. Water Service: Owner will pay water-service use charges for water used by all entities for construction operations.

D. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations.

E. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

F. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.2 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

E. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Use of Permanent Toilets: Use of Owner's existing or new toilet facilities is not permitted.

F. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.

G. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.

a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

I. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.
2. Connect temporary service to Owner's existing power source, as directed by Owner.

J. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.4 SUPPORT FACILITIES INSTALLATION

A. Comply with the following:

1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
2. Utilize designated area within existing building for temporary field offices.
3. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas in accordance with Section 312000 "Earth Moving."
3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course in accordance with Section 321216 "Asphalt Paving."

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

E. Storage and Staging: Use designated areas of Project site for storage and staging needs.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as required.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

    a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touch up signs, so they are legible at all times.

H. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

K. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

1. Do not load elevators beyond their rated weight capacity.
2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work, so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

L. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

M. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas, so no evidence remains of correction work.

N. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

F. Site Enclosure Fence: Prior to commencing earthwork, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

I. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.

J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

K. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard, with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.

    a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.

3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
4. Insulate partitions to control noise transmission to occupied areas.
5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
6. Protect air-handling equipment.
7. Provide walk-off mats at each entrance through temporary partition.

L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
    b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.7 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

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.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been 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 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 property of Contractor. Owner reserves right to take possession of Project identification signs.

2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 011000 "Summary" for Contractor requirements related to Owner-furnished products.
2. Section 017700 "Closeout Procedures" for submitting warranties.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.

1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.

D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:

1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.

E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."

F. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Resolution of Compatibility Disputes between Multiple Contractors:

a. Contractors are responsible for providing products and construction methods compatible with products and construction methods of other contractors.
b. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.5 COORDINATION

A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.

C. Storage:

1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
2. Store products to allow for inspection and measurement of quantity or counting of units.
3. Store materials in a manner that will not endanger Project structure.
4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

    a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

    a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."

2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

    a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."

3. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.

    a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."

4. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

    a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.

C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:

1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 013300 "Submittal Procedures."

1. Form of Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:

1. Construction layout.
2. Installation of the Work.
3. Coordination of Owner's portion of the Work.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

1.2 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.3 INFORMATIONAL SUBMITTALS

A. Certificates: Submit certificate signed by professional engineer, certifying that location and elevation of improvements comply with requirements.

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.

2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to existing conditions. If discrepancies are discovered, notify Architect promptly.

B. Engage a professional engineer experienced in laying out the Work, using the following accepted surveying practices:

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb, and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on Drawings.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.

F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.

3.5 COORDINATION OF OWNER'S PORTION OF THE WORK

A. Site Access: Provide access to Project site for Owner's construction personnel and Owner's separate contractors.

1. Provide temporary facilities required for Owner-furnished, Contractor-installed products.
2. Refer to Section 011000 "Summary" for other requirements for Owner-furnished, Contractor-installed and Owner-furnished, Owner-installed products.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.

3.6 PROGRESS CLEANING

A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.

C. Restore permanent facilities used during construction to their specified condition.

D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition construction waste.
2. Recycling nonhazardous demolition construction waste.
3. Disposing of nonhazardous demolition construction waste.

1.3 DEFINITIONS

A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.

C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner’s property.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 7 days of date established for commencement of the Work.

1.6 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste and Form CWM-8 for demolition waste. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons.
4. Quantity of waste salvaged, both estimated and actual in tons.
5. Quantity of waste recycled, both estimated and actual in tons.
6. Total quantity of waste recovered (salvaged plus recycled) in tons.
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

C. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

D. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

E. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

G. Refrigerant Recovery: Comply with requirements in Section 024119 "Selective Demolition" for refrigerant recovery submittals.

1.7 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Universal certified by EPA-approved certification program.

B. Refrigerant Recovery Technician Qualifications: Comply with requirements in Section 024119 "Selective Demolition."

C. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.

D. Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of each contractor and waste management coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis.[Distinguish between demolition and construction waste.] Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition and construction waste generated by the Work. Use Form CWM-1 for construction waste and Form CWM-2 for demolition waste. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste and Form CWM-4 for demolition waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work in compliance with Section 024119 "Selective Demolition."
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there were no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste and Form CWM-6 for demolition waste. Include the following:

1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include transportation and tipping fees and cost of collection containers and handling for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.

6. Savings in transportation and tipping fees by donating materials.
7. Savings in transportation and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of [50] [75] <Insert number> percent by weight of total nonhazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials[.][, including the following:]

1. Demolition Waste:

a. Asphalt paving.
b. Concrete.
c. Concrete reinforcing steel.
d. Brick.
e. Concrete masonry units.
f. Wood studs.
g. Wood joists.
h. Plywood and oriented strand board.
i. Wood trim.
j. Structural and miscellaneous steel.
k. Rough hardware.
l. Roofing.
m. Insulation.
n. Doors and frames.
o. Door hardware.
p. Metal studs.
q. Gypsum board.
r. Acoustical tile and panels.
s. Equipment.
t. Cabinets.
u. Plumbing fixtures.
v. Piping.
w. Supports and hangers.
x. Valves.
y. Sprinklers.
z. Mechanical equipment.
aa. Refrigerants.
bb. Electrical conduit.
cc. Copper wiring.
dd. Lighting fixtures.
ee. Ballasts.
ff. Electrical devices.
gg. Switchgear and panelboards.
hh. Transformers.

2. Construction Waste:

    a. Masonry and CMU.
    b. Lumber.
    c. Wood sheet materials.
    d. Wood trim.
    e. Metals.
    f. Roofing.
    g. Insulation.
    h. Piping.
    i. Electrical conduit.
    j. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

        1) Paper.
        2) Cardboard.
        3) Boxes.
        4) Plastic sheet and film.
        5) Polystyrene packaging.
        6) Wood crates.
        7) Wood pallets.
        8) Plastic pails.

    k. Construction Office Waste: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following construction office waste materials:

        1) Paper.
        2) Aluminum cans.
        3) Glass containers.

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within [three] <Insert number> days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Comply with requirements in Section 024119 "Selective Demolition" for salvaging demolition waste.

B. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

C. Salvaged Items for Sale: Not permitted on Project site.

D. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

E. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

F. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

G. Plumbing Fixtures: Separate by type and size.

H. Lighting Fixtures: Separate lamps by type and protect from breakage.

I. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING DEMOLITION CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

    a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

3.4 RECYCLING DEMOLITION WASTE

A. Asphalt Paving: Grind asphalt to maximum 1-1/2-inch size.

B. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum 1-1/2-inch size.

D. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Pulverize masonry to maximum 1-inch size.

2. Clean and stack undamaged, whole masonry units on wood pallets.

E. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

F. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

G. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.

H. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

I. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

J. Metal Suspension System: Separate metal members, including trim and other metals from acoustical panels and tile, and sort with other metals.

K. Piping: Reduce piping to straight lengths and store by material and size. Separate supports, hangers, valves, sprinklers, and other components by material and size.

L. Conduit: Reduce conduit to straight lengths and store by material and size.

M. Lamps: Separate lamps by type and store according to requirements in 40 CFR 273.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

    a. Comply with requirements in Section 329300 "Plants" for use of clean sawdust as organic mulch.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

    a. Comply with requirements in Section 329300 "Plants" for use of clean ground gypsum board as inorganic soil amendment.

D. Paint: Seal containers and store by type.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. General: Except for items or materials to be salvaged or recycled, remove waste materials and legally dispose of at designated spoil areas on Owner's property.

C. Burning: Do not burn waste materials.

D. Burning: Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.

3.7 ATTACHMENTS

A. Form CWM-1 for construction waste identification.

B. Form CWM-2 for demolition waste identification.

C. Form CWM-3 for construction waste reduction work plan.

D. Form CWM-4 for demolition waste reduction work plan.

E. Form CWM-5 for cost/revenue analysis of construction waste reduction work plan.

F. Form CWM-6 for cost/revenue analysis of demolition waste reduction work plan.

G. Form CWM-7 for construction waste reduction progress report.

H. Form CWM-8 for demolition waste reduction progress report.

END OF SECTION

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
2. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.3 DEFINITIONS

A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.

5. Submit testing, adjusting, and balancing records.
6. Submit sustainable design submittals not previously submitted.
7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in utility services.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements.
10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.6 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:

1. Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit Final Completion photographic documentation.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1. Submit on digital media acceptable to Architect by uploading to web-based project software site.

E. Warranties in Paper Form:

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

F. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
f. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
g. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
h. Vacuum and mop concrete.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
p. Clean all air devices and first five feet of exhaust duct served by exhaust fan. Reinstall air device after cleaning.
q. Clean five feet of exhaust duct from roof after removal of roof mounted exhaust duct fan.

1) Clean HVAC system in compliance with NADCA ACR.Provide written report on completion of cleaning.

r. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
s. Clean strainers.
t. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste-disposal requirements in Section 015000 "Temporary Facilities and Controls."

END OF SECTION

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record specifications.
3. Record Product Data.

B. Related Requirements:

1. Section 017700 "Closeout Procedures" for general closeout procedures.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up record prints.
2. Number of Copies: Submit copies of Record Drawings as follows:

a. Initial Submittal:

1) Submit one paper-copy set(s) of marked-up record prints.
2) Submit PDF electronic files of scanned record prints and one set(s) of file prints.
3) Submit Record Digital Data Files and one set(s) of plots.
4) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit three paper-copy set(s) of marked-up record prints.
2) Submit PDF electronic files of scanned Record Prints and three set(s) of file prints.
3) Print each drawing, whether or not changes and additional information were recorded.

c. Final Submittal:

1) Submit one paper-copy set(s) of marked-up record prints.
2) Submit Record Digital Data Files and three set(s) of Record Digital Data File plots.

3) Plot each drawing file, whether or not changes and additional information were recorded.

B. Record Specifications: Submit annotated PDF electronic files and Insert number one paper copies of Project's Specifications, including addenda and Contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories and one paper copies of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

1.4 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j. Changes made by Change Order or Construction Change Directive.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Same digital data software program, version, and operating system as for the original Contract Drawings.
2. Format: DWG, Version 2018, Microsoft Windows operating system.
3. Format: Annotated PDF electronic file.
4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
5. Refer instances of uncertainty to Architect for resolution.
6. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.

    a. See Section 013100 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
    b. Architect will provide data file layer information. Record markups in separate layers.

C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.
    e. Name of Contractor.

1.5 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

B. Format: Submit record specifications as annotated PDF electronic file.

1.6 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders and Record Drawings where applicable.

C. Format: Submit Record Product Data as annotated PDF electronic file.

1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of roofing finish and associated fixtures and equipment down to
3. roof deck and structure. Roof drain piping to be demolished to nearest horizontal joint.
4. Demolition of damaged areas of gypsum roof deck.
5. Demolition and removal of certain roof mounted equipment and related accessories.
6. See Division 1 Section "Construction Waste Management" for disposal of demolished materials.
7. **Refrigerant Recovery**

B. Related Requirements:

1. Section 011000 "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 017300 "Execution" for cutting and patching procedures.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project, minimum 5 years documented experience in similar work.

B. **Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.**

C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Standards: Comply with ANSI A10.6 and NFPA 241.

E. Predemolition Conference: Conduct conference at Project site.

1.6 INFORMATIONAL SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's and other tenants' on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Coordinate with owner (BCPSS_PM) on school schedule prior to demolition

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.

F. Storage or sale of removed items or materials on-site is not permitted.

G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

A. A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary."

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. **Refrigerants shall not be released into the environment. Refrigerants shall be captured, stored, transported, and handled in a legal manner. Documentation indicating legal refrigerant disposal shall be presented to the Owner.**

3. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
4. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
5. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 040120.63 - BRICK MASONRY REPAIR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Repairing brick masonry.
2. Removing abandoned anchors.
3. Painting steel uncovered during the work.

1.3 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.

B. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.

C. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of bricks to freezing and thawing.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to brick masonry repair including, but not limited to, the following:

a. Verify brick masonry repair specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.
c. Quality-control program.
d. Coordination with building occupants.

1.5 SEQUENCING AND SCHEDULING

A. Order sand and gray portland cement for colored mortar immediately after approval of mockups. Take delivery of and store at Project site enough quantity to complete Project.

B. Work Sequence: Perform brick masonry repair work in the following sequence, which includes work specified in this and other Sections:

1. Remove plant growth.
2. Inspect masonry for open mortar joints and point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean masonry.
5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
6. Repair masonry, including replacing existing masonry with new masonry materials.
7. Rake out mortar from joints to be repointed.
8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
10. Where water repellents are to be used on or near masonry work, delay application of these chemicals until after pointing and cleaning.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in bricks according to "Brick Masonry Patching" Article. Patch holes in mortar joints according to Section 040120.64 "Brick Masonry Repointing."

1.6 QUALITY ASSURANCE

A. Mockups: Prepare mockups of brick masonry repair to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.

1. Masonry Repair: Prepare sample areas for each type of masonry repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48 inches in least dimension. Construct sample areas in locations in existing walls where directed by Architect unless otherwise indicated. Demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:

   a. Replacement: Four brick units replaced.
   b. Patching: Three small holes at least 1 inch in diameter for each type of brick indicated to be patched.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver bricks to Project site strapped together in suitable packs or pallets or in heavy-duty cartons and protected against impact and chipping.

B. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

E. Store sand where grading and other required characteristics can be maintained and contamination avoided.

F. Handle bricks to prevent overstressing, chipping, defacement, and other damage.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit brick masonry repair work to be performed according to product manufacturers' written instructions and specified requirements.

B. Temperature Limits: Repair brick masonry only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for masonry repair unless otherwise indicated:

1. When air temperature is below 40 deg F, heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F.
2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for seven days after repair.

D. Hot-Weather Requirements: Protect masonry repairs when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Source Limitations: Obtain each type of material for repairing brick masonry (brick, cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 MASONRY MATERIALS

A. Face Brick: As required to complete brick masonry repair work.

a. Physical Properties: According to ASTM C 67

b. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.

2.3 MORTAR MATERIALS

A. Hydrated Lime: ASTM C 207, Type S.

B. Mortar Cement: ASTM C 1329/C 1329M.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Lafarge North America Inc.

C. Mortar Sand: ASTM C 144.

1. Exposed Mortar: Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
2. Colored Mortar: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.

D. Mortar Pigments: ASTM C 979/C 979M, compounded for use in mortar mixes, and having a record of satisfactory performance in masonry mortars.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Davis Colors.
b. LANXESS Corporation.
c. Solomon Colors, Inc.

E. Water: Potable.

2.4 MANUFACTURED REPAIR MATERIALS

A. Brick Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching brick masonry.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Cathedral Stone Products, Inc.
b. Conproco Corporation.
c. Edison Coatings, Inc.

2. Use formulation that is vapor and water permeable (equal to or more than the brick), exhibits low shrinkage, has lower modulus of elasticity than bricks being repaired, and develops high bond strength to all types of masonry.
3. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.

4. Formulate patching compound in colors and textures to match each brick being patched. Provide [sufficient number of] [no fewer than three] <Insert number> colors to enable matching of the color, texture, and variation of each unit.

2.5 ACCESSORY MATERIALS

A. Setting Buttons and Shims: Resilient plastic, nonstaining to masonry, sized to suit joint thicknesses and bed depths of bricks, less the required depth of pointing materials unless removed before pointing.

B. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer according to SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.

1. Surface Preparation: Use coating requiring no better than surface preparation according to manufacturer's literature or certified statement.

C. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.
2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could leave residue on surfaces.

2.6 MORTAR MIXES

A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.

1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.

C. Do not use admixtures in mortar unless otherwise indicated.

D. Mixes: Mix mortar materials in the following proportions:

1. Rebuilding (Setting) Mortar by Property: ASTM C 270, Proportion Specification; Type N, unless otherwise indicated; with cementitious material limited to portland cement and lime.
2. Pigmented, Colored Mortar: Add mortar pigments to produce exposed, setting (rebuilding) mortar of colors required.

PART 3 - EXECUTION

3.1 PROTECTION

A. Prevent mortar from staining face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
2. Keep wall area wet below rebuilding and repair work to discourage mortar from adhering.
3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.

B. Remove gutters and downspouts and associated hardware adjacent to masonry and store during masonry repair. Reinstall when repairs are complete.

1. Provide temporary rain drainage during work to direct water away from building.

3.2 MASONRY REPAIR, GENERAL

A. Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from 20 feet away by Architect.

3.3 ABANDONED ANCHOR REMOVAL

A. Remove abandoned anchors, brackets, wood nailers, and other extraneous items no longer in use unless indicated to remain.

1. Remove items carefully to avoid spalling or cracking masonry.
2. Notify Architect before proceeding if an item cannot be removed without damaging surrounding masonry. Do the following where directed:

a. Cut or grind off item approximately 3/4 inch beneath surface and core drill a recess of same depth in surrounding masonry as close around item as practical.
b. Immediately paint exposed end of item with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended dry film thickness per coat. Keep paint off sides of recess.

3. Patch hole where each item was removed unless directed to remove and replace bricks.

3.4 BRICK REMOVAL AND REPLACEMENT

A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

1. When removing single bricks, remove material from center of brick and work toward outside edges.

B. Support and protect remaining masonry that surrounds removal area.

C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition. Coordinate with new flashing, reinforcement, and lintels, which are specified in other Sections.

D. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.

E. Remove in an undamaged condition as many whole bricks as possible.

1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
3. Store brick for reuse. Store off ground, on skids, and protected from weather.
4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.

F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.

G. Replace removed damaged brick with other removed brick in good condition, where possible, or with new brick matching existing brick. Do not use broken units unless they can be cut to usable size.

H. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.

1. Maintain joint width for replacement units to match existing joints.
2. Use setting buttons or shims to set units accurately spaced with uniform joints.

I. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with enough mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C 67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.

1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
2. Rake out mortar used for laying brick before mortar sets according to Section 040120.64 "Brick Masonry Repointing." Point at same time as repointing of surrounding area.
3. When mortar is hard enough to support units, remove shims and other devices interfering with pointing of joints.

J. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.

1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

3.5 PAINTING STEEL UNCOVERED DURING THE WORK

A. Notify Architect if steel is exposed during masonry removal. Where Architect determines that steel is structural, or for other reasons cannot be totally removed, prepare and paint it as follows:

1. Surface Preparation: Remove paint, rust, and other contaminants according to , as applicable to comply with paint manufacturer's recommended preparation.

2. Antirust Coating: Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).

B. If on inspection and rust removal, the thickness of a steel member is found to be reduced from rust by more than 1/16 inch, notify Architect before proceeding.

3.6 BRICK MASONRY PATCHING

A. Patch the following bricks unless another type of repair or replacement is indicated:

1. Bricks indicated to be patched.
2. Bricks with holes.
3. Bricks with chipped edges or corners. Patch chipped edges or corners measuring more than 3/4 inch in least dimension.
4. Bricks with small areas of deep deterioration. Patch deep deteriorations measuring more than 3/4 inch in least dimension and more than 1/4 inch deep.

B. Remove and replace existing patches .

C. Patching Bricks:

1. Remove loose material from masonry surface. Carefully remove additional material so patch does not have feathered edges but has square or slightly undercut edges on area to be patched and is at least 1/4 inch thick, but not less than recommended in writing by patching compound manufacturer.
2. Mask adjacent mortar joint or rake out for repointing if patch extends to edge of brick.
3. Mix patching compound in individual batches to match each unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.
4. Rinse surface to be patched and leave damp, but without standing water.
5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
6. Place patching compound in layers as recommended in writing by patching compound manufacturer, but not less than 1/4 inch or more than 2 inches thick. Roughen surface of each layer to provide a key for next layer.
7. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of brick. Shape and finish surface before or after curing, as determined by testing, to best match existing brick.
8. Keep each layer damp for 72 hours or until patching compound has set.
9. Remove and replace patches with hairline cracks or that show separation from brick at edges, and those that do not match adjoining brick in color or texture.

3.7 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.

1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

B. Clean adjacent nonmasonry surfaces. Use detergent and soft brushes or cloths.

C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

D. Remove masking materials, leaving no residues that could trap dirt.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.

B. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.

C. Notify [inspectors] [and] [Architect's Project representatives] in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until [inspectors] [and] [Architect's Project representatives] have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

3.9 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property.

B. Masonry Waste: Remove masonry waste and legally dispose of off Owner's property.

END OF SECTION

SECTION 040120.64 - BRICK MASONRY REPOINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Repointing joints with mortar.
2. Repointing joints with sealant.

1.3 ALLOWANCES

A. Preconstruction testing is part of testing and inspecting allowance.

B. Repointing brick masonry is part of masonry repointing allowance.

1.4 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."

1. Unit prices apply to authorized work covered by estimated quantities.
2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.5 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1. Review methods and procedures related to repointing brick masonry including, but not limited to, the following:

a. Verify brick masonry repointing specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.
c. Quality-control program.
d. Coordination with building occupants.
e. <Insert agenda items>.

1.7 SEQUENCING AND SCHEDULING

A. Order sand and gray portland cement for pointing mortar immediately after approval of mockups. Take delivery of and store at Project site enough quantity to complete Project.

B. Work Sequence: Perform brick masonry repointing work in the following sequence, which includes work specified in this and other Sections:

1. Remove plant growth.
2. Inspect masonry for open mortar joints and permanently or temporarily point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean masonry.
5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
6. Repair masonry, including replacing existing masonry with new masonry materials.
7. Rake out mortar from joints to be repointed.
8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
10. Where water repellents are to be used on or near masonry work, delay application of these chemicals until after pointing and cleaning.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in bricks according to Section 040120.63 "Brick Masonry Repair." Patch holes in mortar joints according to "Repointing" Article.

1.8 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include recommendations for product application and use.
3. Include test data substantiating that products comply with requirements.

B. Shop Drawings:

1. Include plans, elevations, sections, and locations of repointing work on the structure.
2. Show provisions for expansion joints or other sealant joints.
3. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.

C. Samples for Verification: For the following:

1. Each type, color, and texture of pointing mortar in the form of sample mortar strips, 6 inches long by 1/2 inch wide, set in aluminum or plastic channels.

    a. Include with each Sample a list of ingredients with proportions of each. Identify sources, both supplier and quarry, of each type of sand and brand names of cementitious materials and pigments if any.

2. Sealant materials.

3. Accessories: Each type of accessory and miscellaneous support.

1.9 INFORMATIONAL SUBMITTALS

A. Quality-control program.

1.10 QUALITY ASSURANCE

A. Brick Masonry Repointing Specialist Qualifications: Engage an experienced brick masonry repointing firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing masonry is insufficient experience for masonry repointing work.

1. Field Supervision: Brick masonry repointing specialist firms shall maintain experienced full-time supervisors on Project site during times that brick masonry repointing work is in progress.

B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage.

C. Mockups: Prepare mockups of brick masonry repointing to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Repointing: Rake out joints in two separate areas, each approximately 36 inches high by 48 inches wide for each type of repointing required, and repoint one of the areas.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.11 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on masonry units as follows:

1. Provide test specimens as indicated and representative of proposed materials and existing construction.
2. Existing Brick: Test each type of existing brick indicated for repointing according to testing methods in ASTM C 67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove [five] <Insert number> existing units from locations designated by Architect. Take testing samples from these units.
3. Existing Mortar: Test according to ASTM C 1324, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength.
4. Temporary Patch: As directed by Architect, provide temporary materials followed by permanent repairs at locations from which existing samples were taken.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

D. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.13 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit repointing work to be performed according to product manufacturers' written instructions and specified requirements.

B. Temperature Limits: Repoint mortar joints only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for mortar-joint pointing unless otherwise indicated:

1. When air temperature is below 40 deg F, heat mortar ingredients and existing masonry walls to produce temperatures between 40 and 120 deg F.
2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for seven days after pointing.

D. Hot-Weather Requirements: Protect mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Source Limitations: Obtain each type of material for repointing brick masonry (cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 MORTAR MATERIALS

A. Water: Potable.

2.3 ACCESSORY MATERIALS

A. Sealant Materials:

1. Sealant manufacturer's standard elastomeric sealant(s) of base polymer and characteristics indicated below and according to applicable requirements in Section 079200 "Joint Sealants."

a. Type: Single-component, nonsag urethane sealant.

2. Colors: Provide colors of exposed sealants to match colors of mortar adjoining installed sealant unless otherwise indicated.
3. Ground-Mortar Aggregate: Custom crushed and ground pointing mortar sand or existing mortar retrieved from joints. Grind to a particle size that matches the adjacent mortar aggregate and color. Remove all fines passing the No. 100 sieve.

B. Joint-Sealant Backing:

1. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
2. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended in writing by sealant manufacturer for preventing sealant from adhering to rigid, inflexible, joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

C. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.

D. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.
2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could leave residue on surfaces.

2.4 MORTAR MIXES

A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again, adding only enough water to produce a damp, unworkable mix that retains its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.

B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.

1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.

C. Do not use admixtures in mortar unless otherwise indicated.

PART 3 - EXECUTION

3.1 PROTECTION

A. Prevent mortar from staining face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
2. Keep wall area wet below pointing work to discourage mortar from adhering.
3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.

B. Remove gutters and downspouts and associated hardware adjacent to masonry and store during masonry repointing. Reinstall when repointing is complete.

1. Provide temporary rain drainage during work to direct water away from building.

3.2 MASONRY REPOINTING, GENERAL

A. Appearance Standard: Repointed surfaces are to have a uniform appearance as viewed from 20 feet away by Architect.

3.3 REPOINTING

A. Rake out and repoint joints to the following extent:

1. All joints in areas indicated.
2. Joints indicated as sealant-filled joints.
3. Joints at locations of the following defects:

a. Holes and missing mortar.
b. Cracks that can be penetrated 1/4 inch or more by a knife blade 0.027 inch thick.
c. Cracks 1/16 inch or more in width and of any depth.
d. Hollow-sounding joints when tapped by metal object.
e. Eroded surfaces 1/4 inch or more deep.
f. Deterioration to point that mortar can be easily removed by hand, without tools.
g. Joints filled with substances other than mortar.

B. Do not rake out and repoint joints where not required.

C. Rake out joints as follows, according to procedures demonstrated in approved mockup:

1. Remove mortar from joints to depth of joint width plus 1/8 inch . Do not remove unsound mortar more than 2 inches deep; consult Architect for direction.

2. Remove mortar from brick and other masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
3. Do not spall edges of brick or other masonry units or widen joints. Replace or patch damaged brick or other masonry units as directed by Architect.

D. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

E. Pointing with Mortar:

1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer, and allow it to become thumbprint hard before applying next layer.
3. After deep areas have been filled to same depth as remaining joints, point joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
6. Hairline cracking within mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

F. Pointing with Sealant: Comply with Section 079200 "Joint Sealants." and as follows:

1. After raking out, keep joints dry and free of mortar and debris.
2. Clean and prepare joint surfaces. Prime joint surfaces unless sealant manufacturer recommends against priming. Do not allow primer to spill or migrate onto adjoining surfaces.
3. Fill sealant joints with specified joint sealant.

    a. Install cylindrical sealant backing beneath the sealant. Where space is insufficient for cylindrical sealant backing, install bond-breaker tape.
    b. Install sealant using only proven installation techniques that ensure that sealant is deposited in a uniform, continuous ribbon, without gaps or air pockets, and with complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding masonry and matching the contour of adjoining mortar joints.
    c. Install sealant as recommended in writing by sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead:

        1) Fill joints to a depth equal to joint width, but not more than 1/2 inch deep or less than 1/4 inch deep.

    d. Tool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant from surfaces adjacent to joint.
    e. Sanded Joints: Immediately after first tooling, apply ground-mortar aggregate to sealant, gently pushing aggregate into the surface of sealant. Lightly retool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant and aggregate from surfaces adjacent to joint.

f. Do not allow sealant to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces, particularly rough textures. Remove excess and spillage of sealant promptly as the work progresses. Clean adjoining surfaces by the means necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes, as demonstrated in an approved mockup.

G. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.4 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.

1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

B. Clean adjacent nonmasonry surfaces. Use detergent and soft brushes or cloths.

C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

D. Remove masking materials, leaving no residues that could trap dirt.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage qualified testing agency to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.

B. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.

C. Notify inspectors in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

END OF SECTION

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel.

1.2 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1.5 ACTION SUBMITTALS

A. Product Data:

1. Structural-steel materials.
2. High-strength, bolt-nut-washer assemblies.

3. Shop primer.
4. Galvanized-steel primer.
5. Etching cleaner.
6. Galvanized repair paint.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Identify members not to be shop primed.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer fabricator shop-painting applicators professional engineer testing agency.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural-steel materials, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.

F. Survey of existing conditions.

G. Source quality-control reports.

H. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).

B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

C. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

1. Welders and welding operators performing work on bottom-flange, demand-critical welds are to pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G are to be considered separate processes for welding personnel qualification.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with applicable provisions of the following specifications and documents:

1. ANSI/AISC 303.
2. ANSI/AISC 360.
3. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

B. Connection Design Information:

1. Option 1: Connection designs have been completed and connections indicated on the Drawings.
2. Option 3 and 3B: Design connections and final configuration of member reinforcement at connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer.
   a. Use Load and Resistance Factor Design or Allowable Stress Design; data are given at service-load level.

2.2 STRUCTURAL-STEEL MATERIALS

A. Wide Flange: ASTM A992.

B. Channels, Angles : ASTM A36/A36M .

C. Plate and Bar: ASTM A36/A36M .

D. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressible-washer type with plain finish.

B. Zinc-Coated High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip zinc coating .
2. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressible-washer type with mechanically deposited zinc coating finish.

2.4 PRIMER

A. Steel Primer:

1. SSPC-Paint 23, latex primer.
2. Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

B. Galvanized-Steel Primer: MPI#26 .

1. Etching Cleaner: MPI#25, for galvanized steel.
2. Galvanizing Repair Paint: ASTM A780/A780M.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.

1. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
2. Mark and match-mark materials for field assembly.
3. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 1.

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened .

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

2.7 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.

1. Galvanize lintels shelf angles and other steel members attached to structural-steel frame and located in exterior walls and roof and exposed to weather.

2.8 SHOP PRIMING

A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces .
6. Corrosion-resisting (weathering) steel surfaces.
7. Surfaces enclosed in interior construction.

B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:

1. SSPC-SP 2.

C. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections.

1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
2. Bolted Connections: Inspect shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
   a. Liquid Penetrant Inspection: ASTM E165/E165M.
   b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
   c. Ultrasonic Inspection: ASTM E164.
   d. Radiographic Inspection: ASTM E94/E94M.
4. In addition to visual inspection, test and inspect shop-welded shear stud connectors in accordance with requirements in AWS D1.1/D1.1M for stud welding and as follows:
   a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear stud connector.
   b. Conduct tests in accordance with requirements in AWS D1.1/D1.1M on additional shear stud connectors if weld fracture occurs on shear stud connectors already tested.
5. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

   1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.

   1. Do not remove temporary shoring supporting composite deck construction and structural-steel framing until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.

B. Maintain erection tolerances of structural steel within ANSI/AISC 303.

C. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

D. Splice members only where indicated.

E. Do not use thermal cutting during erection.

F. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.

1. Joint Type: Snug tightened .

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

3.5 REPAIR

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.

B. Touchup Painting:

1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

1. Bolted Connections: Inspect bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
   a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
      1) Liquid Penetrant Inspection: ASTM E165/E165M.
      2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
      3) Ultrasonic Inspection: ASTM E164.
      4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION 051200

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Exterior non-load-bearing wall framing.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Exterior non-load-bearing wall framing.
2. Power-actuated anchors.
3. Sill sealer gasket.
4. Sill sealer gasket/termite barrier.

1.4 QUALITY ASSURANCE

A. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.

1. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
2. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

a. Upward and downward movement of 1 inch.

3. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

B. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:

1. Floor and Roof Systems: AISI S210.
2. Wall Studs: AISI S211.
3. Headers: AISI S212.
4. Lateral Design: AISI S213.

C. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.2 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: Latex over water-based primer system consisting of a waterborne galvanized-metal primer, exterior enamel intermediate coat matching topcoat, and an exterior enamel topcoat (semi-gloss).

B. Cement Grout: Portland cement, ASTM C150/C150M, Type I; and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.

D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

E. Sill Sealer Gasket: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

F. Sill Sealer Gasket/Termite Barrier: Minimum 68-mil nominal thickness, self-adhering sheet consisting of 64 mils of rubberized asphalt laminated on one side to a 4-mil- thick, polyethylene-film reinforcement, and with release liner on adhesive side

1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

a. Polyguard Products, Inc.

2. Physical Properties:

a. Peel Adhesion: 17.0 lb/in of width when tested in accordance with ASTM D412.
b. Low-Temperature Flexibility: Pass at minus 25 deg F when tested in accordance with)ASTM D146/D146M.
c. Water Vapor Permeance: 0.05 perm maximum when tested in accordance with ASTM E96/E96M, Method B.

d. Resistance to Termite Penetration: Comply with ICC-ES AC380.

2.3 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.

C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.

C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

E. Install sill sealer gasket/termite barrier in accordance with manufacturer's written instructions at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 INSTALLATION OF EXTERIOR NONLOADBEARING WALL FRAMING

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated on Drawings

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to [bypassing] [infill] studs and anchor to building structure.
4. Connect drift clips to cold-formed steel framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated[on Shop Drawings] but not more than 48 inches apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within [12 inches] [18 inches] of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at [96-inch centers] [centers indicated] [centers indicated on Shop Drawings].

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 INSTALLATION TOLERANCES

A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.6 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.7 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Steel framing and supports for mechanical and electrical equipment.
2. Steel framing and supports for applications where framing and supports are not specified in other Sections.

B. Related Requirements:

1. Section 051200 "Structural Steel Framing" for steel framing, supports, elevator machine beams, hoist beams, divider beams, door frames, and other steel items attached to the structural-steel framing.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Fasteners.
2. Shop primers.

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Steel framing and supports for mechanical and electrical equipment.
2. Steel framing and supports for applications where framing and supports are not specified in other Sections.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.

B. Mill Certificates: Signed by stainless steel manufacturers, certifying that products furnished comply with requirements.

C. Welding certificates.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Rolled-Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.

D. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.

E. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.

F. Zinc-Coated Steel Wire Rope: ASTM A741.

1. Wire Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

2.2 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 3, heavy-hex steel structural bolts; ASTM A563, Grade DH3, heavy-hex carbon-steel nuts; and where indicated, flat washers.

D. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.

E. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.3 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting."

B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

C. Galvanize miscellaneous framing and supports where indicated.

D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.6 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

2.7 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.8 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.9 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer primers specified in Section 099113 "Exterior Painting" unless zinc-rich primer is indicated.

D. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."
5. Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."

E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.
2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

C. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installation of Bearing and Leveling Plates" Article.

1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLATION OF BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 REPAIRS

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055000

SECTION 055119 - METAL GRATING STAIRS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal grating stairs.
2. Steel railings and guards.

1.2 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs, railings, and guards.

1. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.
2. Deliver such items to Project site in time for installation.

C. Coordinate locations of hanger rods and struts with other work so they do not encroach on required stair width and are within fire-resistance-rated stair enclosure.

D. Schedule installation of railings and guards so wall attachments are made only to completed walls.

1. Do not support railings and guards temporarily by any means that do not satisfy structural performance requirements.

1.3 ACTION SUBMITTALS

A. Product Data: For metal grating stairs and the following:

1. Gratings.
2. Shop primer products.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachment to other work.
2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
3. Include plan at each level.
4. Indicate locations of anchors, weld plates, and blocking for attachment of wall-mounted handrails.

C. Delegated Design Submittal: For stairs, railings, and guards, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer's experience with providing delegated design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification.

1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers.
2. Protect steel members and packaged materials from corrosion and deterioration.
3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.

a. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Rolled-Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.

D. Steel Bars for Grating Treads: ASTM A36/A36M or steel strip, ASTM A1011/A1011M or ASTM A1018/A1018M.

E. Steel Wire Rod for Grating Crossbars: ASTM A510/A510M.

F. Steel Tubing for Railings and Guards: .

G. Steel Pipe for Railings and Guards: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight, unless another grade and weight are required by structural loads.

2.2 FASTENERS

A. General: Provide where built into exterior walls.

1. Select fasteners for type, grade, and class required.

B. Fasteners for Anchoring Railings and Guards to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings and guards to other types of construction indicated and capable of withstanding design loads.

C. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

D. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for .

E. Post-Installed Anchors: capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

2.3 MISCELLANEOUS MATERIALS

A. Welding Electrodes: Comply with AWS requirements.

B. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting." Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

2.4 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, railings, guards, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Assemble stairs, railings, and guards in shop to greatest extent possible.

1. Disassemble units only as necessary for shipping and handling limitations.
2. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #4 - Good quality, uniform undressed weld with minimal splatter.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.

1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
2. Locate joints where least conspicuous.
3. Fabricate joints that are exposed to weather in a manner to exclude water.
4. Provide weep holes where water may accumulate internally.

2.5 FABRICATION OF STEEL-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Industrial Class, unless more stringent requirements are indicated.

B. Stair Framing:

1. Fabricate stringers of steel plates channels.

a. Stringer Size: .
b. Provide closures for exposed ends of channel stringers.
c. Finish: Shop primed.

2. Construct platforms and tread supports of steel plate channel headers and miscellaneous framing members as required to comply with "Performance Requirements" Article.

a. Provide closures for exposed ends of channel framing.
b. Finish: Shop primed.

3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers.
4. Where stairs are enclosed by gypsum board shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below.

a. Locate hanger rods and struts where they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.

5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

C. Metal Bar-Grating Stairs: Form treads and platforms to configurations shown from metal bar grating; fabricate to comply with NAAMM MBG 531, "Metal Bar Grating Manual."

1. Fabricate treads and platforms from welded steel grating with and crossbars at 4 inches o.c.

2. Fabricate grating treads with rolled-steel floor plate nosing and with steel angle or steel plate carrier at each end for stringer connections.

a. Secure treads to stringers with bolts.

3. Fabricate grating platforms with nosing matching that on grating treads.

a. Secure grating to platform framing by welding.

D. Risers: Open.

2.6 FABRICATION OF STAIR RAILINGS AND GUARDS

A. Comply with applicable requirements in Section 055213 "Pipe and Tube Railings."

B. Fabricate railings and guards to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of member, post spacings, wall bracket spacing, and anchorage, but not less than that needed to withstand indicated loads.

C. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required.

1. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

D. Close exposed ends of railing and guard members with prefabricated end fittings.

E. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.

1. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

F. Connect posts to stair framing by direct welding unless otherwise indicated.

G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.

1. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
2. For galvanized railings and guards, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.
3. For nongalvanized railings and guards, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
4. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports.

1. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.7 FINISHES

A. Finish metal stairs after assembly.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

1. Interior Stairs:

a. SSPC-SP 3, "Power Tool Cleaning."

C. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.

1. For wall-mounted railings, verify locations of concealed reinforcement within gypsum board and plaster assemblies.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF METAL STAIRS

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.

1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

1. Grouted Baseplates: Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces.

    a. Clean bottom surface of baseplates.
    b. Set steel-stair baseplates on wedges, shims, or leveling nuts.
    c. After stairs have been positioned and aligned, tighten anchor bolts.
    d. Do not remove wedges or shims, but if protruding, cut off flush with edge of bearing plate before packing with grout.
    e. Promptly pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

        1) Neatly finish exposed surfaces; protect grout and allow to cure.
        2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints.

1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
3. Comply with requirements for welding in "Fabrication, General" Article.

3.3 REPAIR

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

    a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."

END OF SECTION

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel railings.

1.2 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Manufacturer's product lines of mechanically connected railings.
2. Expanded metal infill panels.
3. Perforated metal infill panels.
4. Woven-wire mesh infill panels.
5. Fasteners.
6. Post-installed anchors.
7. Handrail brackets.
8. Shop primer.
9. Intermediate coats and topcoats.
10. Bituminous paint.
11. Nonshrink, nonmetallic grout.
12. Anchoring cement.
13. Metal finishes.
14. Paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Initial Selection: For products involving selection of color, texture, or design, including mechanical finishes.

D. Delegated Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For delegated design professional engineer.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces of railings from damage by applying a strippable, temporary protective covering before shipping.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: Insert temperature change.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.3 STEEL RAILINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Local Fabrricators

2. Hollaender Mfg. Co.
3. Kee Safety, Inc.
4. R & B Wagner, Inc.
5. TrueNorth Steel.
6. Tuttle, a Dant Clayton Division.
7. VIVA Railings, LLC.

B. Source Limitations: Obtain each type of railing from single source from single manufacturer.

C. Tubing: ASTM A500/A500M (cold formed).

D. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight, unless another grade and weight are required by structural loads.

1. Provide galvanized finish for exterior installations and where indicated.

E. Plates, Shapes, and Bars: ASTM A36/A36M.

2.4 FASTENERS

A. Fastener Materials:

1. Ungalvanized-Steel Railing Components: Plated steel fasteners complying with ASTM F1941/F1941M, Class Fe/Zn 5 for zinc coating.
2. Hot-Dip Galvanized Railing Components: Type 304 stainless steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329/F2329M for zinc coating.
3. Finish exposed fasteners to match appearance, including color and texture, of railings.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
2. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.5 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: High-zinc-dust-content paint, complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

C. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

D. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

2.6 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.

1. Clearly mark units for reassembly and coordinated installation.
2. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water.

1. Provide weep holes where water may accumulate.
2. Locate weep holes in inconspicuous locations.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Gates: Form gates from steel tube of same size and shape as top rails, with infill to match guards. Provide with cam-type, self-closing hinges for fastening to wall and overlapping stop with rubber bumper to prevent gate from opening in direction opposite egress.

I. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #2 welds; good appearance, completely sanded joint, some undercutting and pinholes okay.

J. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

K. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection, using an epoxy structural adhesive, if this is manufacturer's standard splicing method.

L. Form changes in direction as follows:
1. By radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.

M. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

N. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.

O. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

P. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

Q. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work.

1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
2. Coordinate anchorage devices with supporting structure.

R. Expanded-Metal Infill Panels: Fabricate infill panels from expanded-metal sheet of same metal as railings.

1. Edge panels with U-shaped channels made from metal sheet, of same metal as expanded metal and not less than 0.043 inch thick.
2. Orient expanded metal with long dimension of diamonds parallel to top rail.

S. Perforated-Metal Infill Panels: Fabricate infill panels from perforated metal made from same metal as railings in which they are installed.

1. Edge panels with U-shaped channels made from metal sheet, of same metal as perforated metal and not less than 0.043 inch thick.
2. Orient perforated metal with pattern parallel to top rail .

T. Woven-Wire Mesh Infill Panels: Fabricate infill panels from woven-wire mesh crimped into 1-by-1/2-by-1/8-inch metal channel frames.

1. Fabricate wire mesh and frames from same metal as railings in which they are installed.
2. Orient wire mesh with diamonds vertical.

U. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.7 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
2. Comply with ASTM A123/A123M for hot-dip galvanized railings.
3. Comply with ASTM A153/A153M for hot-dip galvanized hardware.
4. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
5. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner and as follows.

1. Comply with SSPC-SP 16.

D. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, hot-dip galvanize anchors to be embedded in exterior concrete or masonry.

E. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below:

1. Exterior Railings: SSPC-SP 6/NACE No. 3.
2. Railings Indicated To Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3.

F. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1 for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated railings with primers specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" unless zinc-rich primer is indicated.
2. Do not apply primer to galvanized surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Perform cutting, drilling, and fitting required for installing railings.

1. Fit exposed connections together to form tight, hairline joints.
2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
4. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
5. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws, using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.

C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve, extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

A. Use stainless steel pipe sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with , mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with , mixed and placed to comply with anchoring material manufacturer's written instructions.

C. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material.

D. Leave anchorage joint exposed with 1/8-inch buildup, sloped away from post.

E. Anchor posts to metal surfaces with flanges, angle type, or floor type, as required by conditions, connected to posts and to metal supporting members as follows:

1. For steel railings, weld flanges to post and bolt to metal supporting surfaces.
2. For aluminum railings, attach posts as indicated, using fittings designed and engineered for this purpose.
3. For stainless steel railings, weld flanges to post and bolt to supporting surfaces.

F. Install removable railing sections, where indicated, in slip-fit stainless steel sockets cast in concrete.

3.5 ATTACHING RAILINGS

A. Anchor railing ends to concrete and masonry with brackets on underside of rails connected to railing ends and anchored to wall construction with anchors and bolts.

B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends.

C. Attach handrails to walls with wall brackets, except where end flanges are used. Provide brackets with 2 1/4" clearance from inside face of handrail and finished wall surface.

1. Use type of bracket with predrilled hole for exposed bolt anchorage.
2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

D. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.

3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
4. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.
5. For steel-framed partitions, fasten brackets directly to steel framing or concealed steel reinforcements, using self-tapping screws of size and type required to support structural loads.
6. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

E. Install railing gates level, plumb, and secure for full opening without interference.

1. Attach hardware using tamper-resistant or concealed means.
2. Adjust hardware for smooth operation.

3.6 REPAIR

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting."

3.7 CLEANING

A. Clean aluminum and stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780/A780M.

3.8 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

SECTION 055533 - METAL LADDERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Aluminum Heavy Duty Fixed Vertical Ladders.

1.2 RELATED SECTIONS

A. Section 051200 - Structural Steel Framing: Roof structure and opening support.

B. Section 055100 - Metal Stair Stairs

C. Section 061053 - Rough Carpentry: Roof framing and opening support.

1.3 REFERENCES

A. ANSI A14.3 : Ladders - Fixed - Safety Requirements.

B. OSHA 1910.23: Ladders.

C. OSHA 1910.28: Duty to have fall protection and falling object protection.

D. OSHA 1910.29: Fall protection systems and falling object protection-criteria and practices.

1.4 SUBMITTALS

A. Submit under provisions of Section 013000.

B. Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.

C. Shop Drawings for Ladders:

1. Plan and section of ladder installation.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store products inside under cover until installation. If stored outside, store under a tarp or suitable cover.

1.6 WARRANTY

A. Limited Warranty: Five years against defective material and workmanship, covering parts only, no labor or freight. Defective parts, if deemed so by the manufacturer, will be replaced at no charge, freight excluded, upon inspection at manufacturer's plant which warrants same.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Precision Ladders, LLC, which is located at: P. O. Box 2279 ; Morristown, TN 37816-2279; Toll Free Tel: 800-225-7814; Tel: 423-586-2265; Email: info@PrecisionLadders.com; Web: www.PrecisionLadders.com

B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 ALUMINUM FIXED VERTICAL LADDER

A. Aluminum Heavy Duty Fixed Vertical Ladder and Components: Ladder, side rails, floor mounting brackets.

1. Model: Model FLH-02 Aluminum Heavy Duty Fixed Vertical Ladder as manufactured by Precision Ladders, LLC.
2. Capacity: Unit shall support a 1,500 lb loading without failure, and individual treads shall withstand a 3,000 lb loading without failure.
3. Performance Standard: Units designed and manufactured to meet or exceed ANSI A14.3, OSHA 1910.23, OSHA 1910.28 and OSHA 1910.29.

B. Components:

1. Ladder Stringer: 3 inch by 1 inch by 1/8 inch extruded 6005-T5 aluminum tubing. Pitch: 90 degrees.
2. Ladder Tread: 2-1/4 inch by 3/4 inch by 1/4 inch extruded 6005-T5 aluminum with deeply serrated top surface.
3. Ladder Mounting Bracket: 8-1/2 inch by 2 inch by 3 inch by 1/4 inch thick aluminum angle.
4. Floor Brackets: Floor bracket at foot of each stringer, 3 by 2 by 1/4 inch.
5. Finishes:

    a. Standard: Mill finish on aluminum ladder components.

2.3 FABRICATION

A. Completely fabricate ladder ready for installation before shipment to the site.

PART 3 - EXECUTION

3.1 EXAMINATION

A. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

B. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

3.2 INSTALLATION

A. Install in accordance with approved submittals.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Rooftop equipment bases and support curbs.
2. Wood blocking, cants, and nailers.
3. Wood sleepers.

B. Related Requirements:

1. Section 061600 "Sheathing" for sheathing, subflooring, and underlayment.

1.3 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat all miscellaneous carpentry unless otherwise indicated.

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.

2.3 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.

3. Rooftop equipment bases and support curbs.
4. Cants.

B. Dimension Lumber Items: grade lumber of the following species:

1. Spruce-pine-fir; NLGA.

C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fastenersof Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F1667.

C. Screws for Fastening to Metal Framing: ASTM C1002, length as recommended by screw manufacturer for material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

C. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

D. Do not splice structural members between supports unless otherwise indicated.

E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

F. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

H. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

I. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in ICC's International Building Code.
2. ICC-ES evaluation report for fastener.

J. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILER

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Wall sheathing.
2. Roof sheathing.

B. Product Data Submittals: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency in accordance with ASTM D5516.
4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. For air-barrier and water-resistant glass-mat gypsum sheathing, include manufacturer's technical data and tested physical and performance properties of products.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: From air-barrier and water-resistant glass-mat gypsum sheathing manufacturer, certifying compatibility of sheathing accessory materials with Project materials that connect to or that come in contact with the sheathing.

B. Product Test Reports: For each air-barrier and water-resistant glass-mat gypsum sheathing assembly, indicating compliance with specified requirements, for tests performed by a qualified testing agency.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested in accordance with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

B. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing Performance: Air-barrier and water-resistant glass-mat gypsum sheathing assembly, and seals with adjacent construction, are to be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies are to be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing , tie-ins to other installed air barriers, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

2.2 WALL SHEATHING

A. Plywood Sheathing, Walls: DOC PS 1, sheathing.

1. Span Rating: Not less than 32/16.
2. Nominal Thickness: Not less than 11/32 inch.

2.3 ROOF SHEATHING

A. Plywood Sheathing, Roofs: DOC PS 1, sheathing.

1. Span Rating: Not less than 48/24.
2. Nominal Thickness: Not less than 15/32 inch.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

2.5 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.
2. ICC-ES evaluation report for fastener.

D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 INSTALLATION OF WOOD STRUCTURAL PANEL

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:

a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.

b. Screw to cold-formed metal framing.
c. Space panels 1/8 inch apart at edges and ends.

END OF SECTION

SECTION 070150.19 - PREPARATION FOR REROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Full tear-off of entire roof system.
2. Removal of flashings and counterflashings.

B. Related Requirements:

1. Section 011000 "Summary" for use of premises and for phasing requirements.
2. Section 015000 "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for reroofing preparation.

1.3 UNIT PRICES

A. Work of this Section is affected by insulation removal and replacement unit price .

1.4 DEFINITIONS

A. EPS: Molded (expanded) polystyrene.

B. Full Roof Tear-off: Removal of existing roofing system down to existing roof deck.

C. OSB: Oriented strand board.

D. Partial Roof Tear-off: Removal of selected components and accessories from existing roofing system.

E. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

F. Roof Re-Cover Preparation: Existing roofing system is to remain and be prepared for new roof installed over it.

1.5 FIELD CONDITIONS

A. Existing Roofing System: Built-up asphalt roofing.

B. Owner will occupy portions of building immediately below reroofing area.

1. Conduct reroofing so Owner's operations are not disrupted.
2. Provide Owner with not less than 72 hours' written notice of activities that may affect Owner's operations.
3. Coordinate work activities daily with Owner so Owner has adequate advance notice to place protective dust and water-leakage covers over sensitive equipment and furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below work area.
4. Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below affected area.

    a. Verify that occupants below work area have been evacuated before proceeding with work over impaired deck area.

C. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.

D. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

E. Conditions existing at time of inspection for bidding will be maintained by Owner as far as practical.

1. A roof moisture survey of existing roofing system is available for Contractor's reference.
2. The results of an analysis of test cores from existing roofing system are available for Contractor's reference.
3. Construction Drawings and Project Manual for existing roofing system are provided for Contractor's convenience and information, but they are not a warranty of existing conditions. They are intended to supplement rather than serve in lieu of Contractor's own investigations. Contractor is responsible for conclusions derived from existing documents.

F. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.

1. Remove only as much roofing in one day as can be made watertight in the same day.

G. Hazardous Materials: It is not expected that hazardous materials, such as asbestos-containing materials, will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. Existing roof will be left no less watertight than before removal.
3. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.

    a. Hazardous materials will be removed by Owner under a separate contract.

H. Hazardous Materials: A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except according to procedures specified elsewhere in the Contract Documents.
3. Coordinate reroofing preparation with hazardous material remediation to prevent water from entering existing roofing system or building.

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Protect existing roofing system that is not to be reroofed.
2. Loosely lay 1-inch- minimum thick, EPS insulation over existing roofing in areas not to be reroofed.

    a. Loosely lay 15/32-inch plywood or OSB panels over EPS. Extend EPS past edges of plywood or OSB panels a minimum of 1 inch.

3. Limit traffic and material storage to areas of existing roofing that have been protected.
4. Maintain temporary protection and leave in place until replacement roofing has been completed. Remove temporary protection on completion of reroofing.
5. Comply with requirements of existing roof system manufacturer's warranty requirements.

B. Shut off rooftop utilities and service piping before beginning the Work.

C. Test existing roof drains to verify that they are not blocked or restricted.

1. Immediately notify Architect of any blockages or restrictions.

D. Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work.

1. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.

E. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.

F. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday.

1. Prevent debris from entering or blocking roof drains and conductors.

    a. Use roof-drain plugs specifically designed for this purpose.
    b. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.

2. If roof drains are temporarily blocked or unserviceable due to roofing system removal or partial installation of new roofing system, provide alternative drainage method to remove water and eliminate ponding.

    a. Do not permit water to enter into or under existing roofing system components that are to remain.

3.2 ROOF TEAR-OFF

A. Notify Owner each day of extent of roof tear-off proposed for that day and obtain authorization to proceed.

B. Full Roof Tear-off: Remove existing roofing and other roofing system components down to the existing roof deck.

1. Remove substrate board vapor retarder roof insulation and cover board.
2. Remove base flashings and counter flashings.
3. Remove perimeter edge flashing and gravel stops.
4. Remove copings.
5. Remove expansion-joint covers.
6. Remove flashings at pipes, curbs, mechanical equipment, and other penetrations.
7. Remove roof drains indicated on Drawings to be removed.
8. Remove wood blocking, curbs, and nailers.
9. Bitumen and felts that are firmly bonded to concrete decks are permitted to remain if felts are dry.

    a. Remove unadhered bitumen, unadhered felts, and wet felts.

10. Remove excess asphalt from steel deck.

    a. A maximum of 15 lb/100 sq. ft. of asphalt is permitted to remain on steel decks.

11. Remove fasteners from deck or cut fasteners off slightly above deck surface.

3.3 DECK PREPARATION

A. Inspect deck after tear-off of roofing system.

B. If deck surface is unsuitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify Architect.

1. Do not proceed with installation until directed by Architect.

3.4 BASE FLASHING REMOVAL

A. Remove existing base flashings.

1. Clean substrates of contaminants, such as asphalt, sheet materials, dirt, and debris.

B. Remove / Replace All metal counterflashings.

1. Replace metal counterflashings damaged during removal with counterflashings specified in Section 076200 "Sheet Metal Flashing and Trim."

C. Inspect parapet sheathing, wood blocking, curbs, and nailers for deterioration and damage.

1. If parapet sheathing, wood blocking, curbs, or nailers have deteriorated, immediately notify Architect.

D. Remove existing parapet sheathing and replace with new parapet sheathing to comply with Section 061600 "Sheathing."

1. If parapet framing, wood blocking, curbs, or nailers have deteriorated, immediately notify Architect.

E. When directed by Architect, replace parapet framing, wood blocking, curbs, and nailers to comply with Section 061053 Miscellaneous Rough Carpentry."

3.5 FASTENER PULL-OUT TESTING

A. Perform fastener pull-out tests according to SPRI FX-1, and submit test report to project manager before installing new roofing system.

1. Obtain roofing manufacturer's approval to proceed with specified fastening pattern.

a. Roofing manufacturer may furnish revised fastening pattern commensurate with pull-out test results.

3.6 DISPOSAL

A. Collect demolished materials and place in containers.

1. Promptly dispose of demolished materials.
2. Do not allow demolished materials to accumulate on-site.
3. Storage or sale of demolished items or materials on-site is not permitted.

B. Transport and legally dispose of demolished materials off Owner's property.

END OF SECTION

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Mineral-wool blanket insulation.
2. Mineral-wool board insulation.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Mineral-wool blanket insulation.
2. Mineral-wool board insulation.

1.4 INFORMATIONAL SUBMITTALS

A. Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope.

1. Sign, date, and post the certification in a conspicuous location on Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 MINERAL-WOOL BLANKET INSULATION

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than Insert value percent.

B. Mineral-Wool Blanket Insulation, Unfaced: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; passing ASTM E136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Johns Manville; a Berkshire Hathaway company.
    b. Rockwool International.
    c. Thermafiber, Inc.; an Owens Corning company.

2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
3. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.

2.2 MINERAL-WOOL BOARD INSULATION

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than Insert value percent.

B. Mineral-Wool Board Insulation, Types IA and IB, Unfaced: ASTM C612, Types IA and IB; passing ASTM E136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements provide products by one of the following:

    a. Johns Manville; a Berkshire Hathaway company.
    b. Rockwool International.
    c. Thermafiber, Inc.; an Owens Corning company.

2. Nominal Density: 4 lb/cu. ft..
3. Flame-Spread Index: Not more than 15 when tested in accordance with ASTM E84.
4. Smoke-Developed Index: Not more than zero when tested in accordance with ASTM E84.
5. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.3 ACCESSORIES

A. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Install insulation with manufacturer's R-value label exposed after insulation is installed.

D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer.

1. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
2. Press units firmly against inside substrates.
3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."

B. Mineral-Wool Board Insulation: Install insulation fasteners 4 inches from each corner of board insulation, at center of board, and as recommended by manufacturer.

1. Fit courses of insulation between obstructions, with edges butted tightly in both directions, and with faces flush.
2. Press units firmly against inside substrates.

3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
5. For wood-framed construction, install blankets according to ASTM C1320 and as follows:

    a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.

6. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.

    a. Exterior Walls: Set units with facing placed as indicated on Drawings.
    b. Interior Walls: Set units with facing placed as indicated on Drawings.

3.5 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 075423 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Adhered thermoplastic polyolefin (TPO) roofing system.
2. Vapor retarder.
3. Flat and Tapered Roof insulation.
4. Walkways.

B. Section includes installation of sound-absorbing insulation strips in ribs of roof deck. Sound-absorbing insulation strips are furnished under Section 053100 "Steel Decking."

C. Related Requirements:

1. Section 061053 "Rough Carpentry" for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.
2. Section 061600 "Sheathing" for wood-based, structural-use roof deck panels.
3. Section 072100 "Thermal Insulation" for insulation beneath the roof deck.
4. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
5. Section 077100 "Roof Specialties" for manufactured copings and roof edge flashings.
6. Section 077129 "Manufactured Roof Expansion Joints" for manufactured roof expansion-joint assemblies.
7. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to Work of this Section.

1.4 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.

2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

B. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect,Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.

B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane termination details.
3. Flashing details at penetrations.
4. Tapered insulation layout, thickness, and slopes.
5. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer manufacturer.

B. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

a. Submit evidence of compliance with performance requirements.

2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

C. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

B. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is listed in FM Approvals' RoofNav for roofing system identical to that used for this Project.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover boards, vapor retarder, substrate board, and other components of roofing system.
2. Warranty Period: 20 years from date of Substantial Completion **with No Dollar Limit**

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, and walkway products, for the following warranty period:

1. Warranty Period: Five years from date of Substantial Completion.
2. Special Warranty: Include annual inspection report and written report submitted to the Owner for the years covered.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing system and flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.

1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746, ASTM D4272, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:

1. Zone 1 (Roof Area Field): 50 lbf/sq. ft..
2. Zone 2 (Roof Area Perimeter): 80lbf/sq. ft.
3. Zone 3 (Roof Area Corners): 120lbf/sq. ft.

D. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.

1. Wind Uplift Load Capacity: 120 psf.

E. ENERGY STAR Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low -slope roof products.

F. Energy Performance: Roofing system shall have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.

G. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

H. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.2 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

A. TPO Sheet: ASTM D6878/D6878M, one ply membrane, internally fabric- or scrim-reinforced, fully adhered TPO sheet over vapor retarder / base sheet, rigid insulation with cover board, and miscellaneous wood nailers.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. GAF
   b. Carlisle SynTec Incorporated.
   c. Firestone Building Products.(Basis of Design- Ultraply-TPO)
   d. Mule-Hide Products Co., Inc.
   e. Johns Mansville

2. Source Limitations: Obtain components for roofing system from roof membrane manufacturer.
3. Thickness: 80 mils, nominal.
4. Exposed Face Color: White.

2.3 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.

1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's unreinforced TPO sheet flashing, **0.060 minimum thickness**, of same color as TPO sheet.

C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.

D. Roof Vents: As recommended by roof membrane manufacturer.

1. Size: Not less than 4-inch diameter.

E. Bonding Adhesive: Manufacturer's standard.

F. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

G. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.

H. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.

I. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.4 VAPOR RETARDER

A. Self-Adhering-Sheet Vapor Retarder: ASTM D1970/D1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor retarder manufacturer.

2.5 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by TPO roof membrane manufacturer, approved for use in FM Approvals' RoofNav listed roof assemblies.

B. Polyisocyanurate Board Insulation: ASTM C1289, , felt or glass-fiber mat facer on both major surfaces.

1. Compressive Strength: 25 psi.
2. Board Size: 48" x 96"
3. Board Thickness: 2.6" (R15), Minimum 2 layers = R30 Min.

2.6 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

1. Full-spread, spray-applied, low-rise, two-component urethane adhesive.

C. Cover Board: ASTM C1289 Type II, Class 4, Grade 2, 1/2-inch- thick HD polyiso Coverboard

1. Compressive Strength: 110 psi.
2. Board Size: 48" x 96"
3. Board Thickness: 1/2" or 2 layers of 1/4" for total of 1/2"

4. Minimum compressive strength of 110 psi.

2.7 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer. White with yellow border.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
4. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as recommended by roofing system manufacturer, when tested according to ASTM F2170.

a. Test Frequency: One test probe per each 1000 sq. ft., or portion thereof, of roof deck, with not less than three tests probes.
b. Submit test reports within 24 hours after performing tests.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Perform fastener-pullout tests according to roof system manufacturer's written instructions.

1. Submit test result within 24 hours after performing tests.

a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

3.3 INSTALLATION OF ROOFING, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning Work on adjoining roofing.

C. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.

3.4 INSTALLATION OF VAPOR RETARDER

A. Self-Adhering-Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 and 6 inches, respectively.

1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
2. Seal laps by rolling.

B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.5 INSTALLATION OF INSULATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.

B. Comply with roofing system and roof insulation manufacturer's written instructions for installing roof insulation.

C. Installation Over Metal Decking:

1. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows .

a. Locate end joints over crests of decking.
b. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

1) Trim insulation so that water flow is unrestricted.

f. Fill gaps exceeding 1/4 inch with insulation.
g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
h. Loosely lay base layer of insulation units over substrate.

i. Mechanically attach base layer of insulation using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.

1) Fasten insulation according to requirements in [FM Approvals' RoofNav for specified Windstorm Resistance Classification] [SPRI's Directory of Roof Assemblies for specified Wind Uplift Load Capacity].
2) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

2. Install upper layers of insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.

a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

1) Trim insulation so that water flow is unrestricted.

f. Fill gaps exceeding 1/4 inch with insulation.
g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
h. Loosely lay each layer of insulation units over substrate.
i. Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

1) Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
2) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
3) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

D. Installation Over Concrete Decks:

1. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows.

a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

1) Trim insulation so that water flow is unrestricted.

e. Fill gaps exceeding 1/4 inch with insulation.
f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

g. Loosely lay base layer of insulation units over substrate.
h. Adhere base layer of insulation to vapor retarder according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

1) Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 sq. ft., and allow primer to dry.
2) Set insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
3) Set insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
4) Set insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

2. Install upper layers of insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.

a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

1) Trim insulation so that water flow is unrestricted.

f. Fill gaps exceeding 1/4 inch with insulation.
g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
h. Loosely lay each layer of insulation units over substrate.
i. Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

1) Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
2) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
3) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

E. Installation Over Lightweight Insulating Concrete Decks:

1. Mechanically fasten vented base sheet to lightweight insulating concrete, with vented side down, using mechanical fasteners specifically designed and sized for fastening to lightweight insulating concrete decks.

a. Fasten vented base sheet according to requirements in FM Approvals' RoofNav for specified Windstorm Resistance Classification.
b. Fasten vented base sheet to resist specified uplift pressure at corners, perimeter, and field of roof.

2. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows.

a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

    1) Trim insulation so that water flow is unrestricted.

e. Fill gaps exceeding 1/4 inch with insulation.
f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
g. Loosely lay base layer of insulation units over substrate.
h. Adhere base layer of insulation to vented base sheet according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

    1) Set insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
    2) Set insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
    3) Set insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3. Install upper layers of insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.

a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

    1) Trim insulation so that water flow is unrestricted.

f. Fill gaps exceeding 1/4 inch with insulation.
g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
h. Loosely lay each layer of insulation units over substrate.
i. Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

    1) Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
    2) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
    3) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.6 INSTALLATION OF ADHERED ROOF MEMBRANE

A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.

B. Unroll roof membrane and allow to relax before installing.

C. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.

F. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.

G. Apply roof membrane with side laps shingled with slope of roof deck where possible.

H. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings, to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

I. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.7 INSTALLATION OF BASE FLASHING

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.8 INSTALLATION OF WALKWAYS

A. Flexible Walkways:

1. Install flexible walkways at the following locations:
   a. Perimeter of each rooftop unit.
   b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
   c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
   d. Top and bottom of each roof access ladder.
   e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
   f. Locations indicated on Drawings.
   g. As required by roof membrane manufacturer's warranty requirements.

2. Provide 6-inch clearance between adjoining pads.
3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

B. Roof-Paver Walkways: Install walkway roof pavers according to manufacturer's written instructions.

1. Install roof paver walkways at the following locations:

   a. Perimeter of each rooftop unit.
   b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
   c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
   d. Top and bottom of each roof access ladder.
   e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
   f. Locations indicated on Drawings.
   g. As required by roof membrane manufacturer's warranty requirements.

2. Provide 3 inches of space between adjacent roof pavers.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and to inspect substrate conditions, surface preparation, roof membrane application, sheet flashings, protection, and drainage components, and to furnish reports to Architect.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.

C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.10 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing system, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.11 Contractor's Warranty:

A. Submit roofing installers warranty signed by roofing contractor covering the work of this section, including but not limited to all components of roofing such as roofing membrane, base flashing, roofing insulation, adhesives, fasteners,coverboard, vapor retarder, roof drains, gutters, piping, edge metals, roof access ladders, roof hatches, curbs, walk pads , etc.

3.12 Performance Warranty:

A. 5 year performance warranty from the date of substantial completion. Contractor shall provide labor and materials in addition to manufacturer's warranty. This warranty shall include an annual inspection and written report submitted to the Project Manager for the covered years.

END OF SECTION

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Manufactured reglets with counterflashing.
2. Formed roof-drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed steep-slope roof sheet metal fabrications.
5. Formed wall sheet metal fabrications.

B. Related Requirements:

1. Section 077100 "Roof Specialties" for manufactured copings, roof-edge specialties, roof-edge drainage systems, reglets, and counterflashings.
2. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.3 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Review requirements for insurance and certificates if applicable.
4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following

1. Underlayment materials.
2. Elastomeric sealant.
3. Butyl sealant.
4. Epoxy seam sealer.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

D. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested.

C. Product Test Reports: For each product, for tests performed by a qualified testing agency.

D. Evaluation Reports: For copings and roof edge flashing, from ICC-ES showing compliance with ANSI/SPRI/FM 4435/ES-1.

E. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

B. Special warranty.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested , shop shall be listed as able to fabricate required details as tested and approved.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockup of typical roof edge, including , approximately 10 feet long, including supporting construction cleats, seams, attachments, and accessories.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
2. Protect stored sheet metal flashing and trim from contact with water.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.10 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. SPRI Wind Design Standard: Manufacture and install copings roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
   1. Wind Uplift Forces: Resist the following forces. Comply with recommendations of FM DS 1-49 and fabricate and install in accordance with ANSI/SPRI ES-1.
      a. 1. 50 PSF min. in Zone 1.
      b. 2. 80 PSF min. in Zone 2.
      c. 3. 120 PSF min. in Zone 3.
      d. 170 PSF min. at canopy roofs..

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B209, Min 0.50 coping and 0.40 Facia, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

   1. Exposed Coil-Coated Finish:

      a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

   2. Color: As selected by Architect from manufacturer's full range.
   3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

C. Stainless Steel Sheet: ASTM A666, Type 304, 28 gauge dead soft, fully annealed; with smooth, flat surface.

D. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet, minimum 24 gauge. in accordance with ASTM A653/A653M, G90 coating designation; prepainted by coil-coating process to comply with ASTM A755/A755M.

1. Surface: Smooth, flat and with manufacturer's standard clear acrylic coating on both sides.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.

1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

a. GCP Applied Technologies Inc.

2. Source Limitations: Obtain underlayment from single source from single manufacturer.
3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.

2.4 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

D. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.

G. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Cheney Flashing Company.
    b. Fry Reglet Corporation.
    c. Heckmann Building Products, Inc.
    d. Hickman Company, W. P.
    e. Hohmann & Barnard, Inc.
    f. Keystone Flashing Company, Inc.
    g. National Sheet Metal Systems, Inc.

2. Source Limitations: Obtain reglets from single source from single manufacturer.
3. Material: Stainless steel, 0.0188 inch thick.
4. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
5. Accessories:

    a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
    b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.

2.5 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems w/ minimum 2T bend on hems and radius bends.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

G. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
2. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
3. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

H. Do not use graphite pencils to mark metal surfaces.

2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Roof edge Gutters:

1. Fabricate to cross section required, with riveted and soldered joints, complete with end pieces, outlet tubes, and other special accessories as required.
2. Fabricate in minimum 96-inch- long sections. Fabricate expansion joints and accessories from same metal as gutters unless otherwise indicated.
3. Fabricate gutters with built-in expansion joints.
4. Accessories: Wire-ball downspout strainer.
5. Fabricate from the following materials:

    a. Copper: Insert value.
    b. Zinc-Tin Alloy-Coated Copper: Insert value.

B. Downspouts: Fabricate rectangular downspouts to dimensions indicated on Drawings, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.

1. Fabricated Hanger Style: Fig. 1-35G in accordance with SMACNA's "Architectural Sheet Metal Manual."
2. Fabricate from the following materials:

    a. Aluminum: 0.050 inch thick.

C. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fabricate from the following materials:

1. Stainless Steel: 0.0188 inch thick.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing (Gravel Stop) and Fascia Cap: Fabricate in minimum 96-inch- long, but not exceeding 12-foot-long sections. Furnish with 6-inch- wide, joint cover plates.

1. Joint Style: Butted with expansion space and 6-inch- wide, concealed backup plate.
2. Fabricate with scuppers spaced 10 feet apart, to dimensions required with 4-inch- wide flanges and base extending 4 inches beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
3. Fabricate from the following materials:

    a. Aluminum: 0.050 inch thick.

B. Copings: Fabricate in minimum 96-inch- long, but not exceeding 12-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.

1. Joint Style: Butted with expansion space and 6-inch- wide, concealed backup plate.
2. Fabricate from the following materials:

    a. Aluminum: 0.050 inch thick.

C. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:

1. Stainless Steel: 0.0188 inch thick.

D. Flashing Receivers: Fabricate from the following materials:

1. Stainless Steel: 0.0156 inch thick.

E. Bends
1. **All bends in sheet metal flashing shall be 2T**

2.8 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high, end dams. Fabricate from the following materials:

1. Stainless Steel: 0.0156 inch thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:

1. Stainless Steel: 0.0156 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering, High-Temperature Sheet Underlayment:

1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
2. Prime substrate if recommended by underlayment manufacturer.
3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
6. Roll laps and edges with roller.
7. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of .
3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.

6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
8. Do not field cut sheet metal flashing and trim by torch.
9. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.

a. Embed hooked flanges of joint members not less than 1 inch into sealant.
b. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
c. Adjust setting proportionately for installation at higher ambient temperatures.

1) Do not install sealant-type joints at temperatures below 40 deg F.

2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.4 INSTALLATION OF ROOF-DRAINAGE SYSTEM

A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Roof edge Gutters:

1. Join sections with riveted and soldered joints.
2. Provide for thermal expansion.
3. Slope to downspouts.
4. Provide end closures and seal watertight with sealant.
5. Install underlayment layer in built-in gutter trough and extend to drip edge at eaves and under underlayment on roof sheathing.

    a. Lap sides minimum of 2 inches over underlying course.
    b. Lap ends minimum of 4 inches.
    c. Stagger end laps between succeeding courses at least 72 inches.
    d. Fasten with roofing nails.
    e. Install slip sheet over underlayment.

6. Anchor and loosely lock back edge of gutter to continuous eave or apron flashing.
7. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 18 inches apart.

C. Downspouts:

1. Join sections with 1-1/2-inch telescoping joints.
2. Provide hangers with fasteners designed to hold downspouts securely to walls.
3. Locate hangers at top and bottom and at approximately 60 inches o.c.
4. Provide elbows at base of downspout to direct water away from building.

D. Parapet Scuppers:

1. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
2. Anchor scupper closure trim flange to exterior wall and to scupper.
3. Loosely lock front edge of scupper with conductor head.
4. exterior wall scupper flanges into back of conductor head.

3.5 INSTALLATION OF ROOF FLASHINGS

A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Copings:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated.

    a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch centers.
    b. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.

3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.

1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4 inches over base flashing.
3. Lap counterflashing joints minimum of 4 inches.
4. Secure in waterproof manner by means of anchor and washer spaced at 12 inches o.c. along perimeter and 6 inches o.c. at corners areas unless otherwise indicated.

3.6 INSTALLATION OF WALL FLASHINGS

A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend beyond wall openings.

3.7 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.8 CLEANING

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

3.9 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.

C. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Copings.
2. Roof-edge specialties.
3. Roof-edge drainage systems.
4. Reglets and counterflashings.

B. Related Requirements:

1. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
2. Section 079200 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof specialties.

1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
4. Detail termination points and assemblies, including fixed points.
5. Include details of special conditions.

C. Samples: For each type of roof specialty and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of roof specialty.

B. Sample Warranty: For manufacturer's special warranty.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are FM Approvals listed for specified class and SPRI ES-1 tested to specified design pressure.

B. Source Limitations: Obtain roof specialties approved by manufacturer providing roofing-system warranty specified in Section 075423 THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.8 WARRANTY

A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 075423THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. SPRI Wind Design Standard: Manufacture and install roof-edge specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: As indicated on Drawings.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COPINGS

A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding , concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Architectural Products Company.
b. ATAS International, Inc.
c. Berridge Manufacturing Company.
d. Drexel Metals.
e. Metal-Era, Inc.
f. PAC-CLAD; Petersen Aluminum Corporation.
g. SAF (Southern Aluminum Finishing Company, Inc.).

2. Formed Aluminum Sheet Coping Caps: Aluminum sheet, 0.040 inch thick.

a. Surface: Smooth, flat finish.
b. Finish: Two-coat fluoropolymer.
c. Color: As selected by Architect from manufacturer's full range.

3. Corners: mechanically clinched and sealed watertight.
4. Special Fabrications: Match profile of existing cast concrete coping cap.
5. Coping-Cap Attachment Method: , fabricated from coping-cap material.

a. Face-Leg Cleats: Concealed, continuous aluminum.

2.3 ROOF-EDGE SPECIALTIES

A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding and a continuous metal receiver with integral drip-edge cleat to engage fascia cover and secure single-ply roof membrane. Provide matching corner units.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Berridge Manufacturing Company.
    b. Drexel Metals.
    c. Exceptional Metals.
    d. Hickman Company, W. P.
    e. Metal-Era, Inc.
    f. Perimeter Systems; a division of SAF.
    g. Insert manufacturer's name.

2. Formed Aluminum Sheet Fascia Covers: Aluminum sheet, thickness as required to meet performance requirements.

    a. Surface: Smooth, flat finish.
    b. Color: As selected by Architect from manufacturer's full range.

3. Corners: Factory mitered and mechanically clinched and sealed watertight.
4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
5. Receiver: Manufacturer's standard material and thickness.
6. Fascia Accessories: Fascia extenders with continuous hold-down cleats.

2.4 ROOF-EDGE DRAINAGE SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Architectural Products Company.
2. ATAS International, Inc.
3. Hickman Company, W. P.
4. Metal-Era, Inc.
5. Perimeter Systems; a division of SAF.

B. Gutters: Manufactured in uniform section lengths not exceeding , with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.

1. Aluminum Sheet: 0.050 inch thick.
2. Gutter Profile: Style A according to SMACNA's "Architectural Sheet Metal Manual."
3. Gutter Supports: Gutter brackets with finish matching the gutters.

C. Downspouts: Plain rectangular complete with mitered elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Formed Aluminum: 0.050 inch thick.

D. Aluminum Finish: .

2.5 REGLETS AND COUNTERFLASHINGS

A. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

1. Heckmann Building Products, Inc.
2. Metal-Era, Inc.

2.6 MATERIALS

A. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

2.7 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Coil-Coated Galvanized-Steel Sheet Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with ASTM A755/A755M and coating and resin manufacturers' written instructions.

    a. Concealed Surface Finish: Apply pretreatment and manufacturer's standard acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

E. Coil-Coated Aluminum Sheet Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

    a. Concealed Surface Finish: Apply pretreatment and manufacturer's standard acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

F. Aluminum Extrusion Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Concealed Surface Finish: Apply pretreatment and manufacturer's standard acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum and stainless steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet 10 feet with no joints within 24 inches of corners or intersections unless otherwise indicated on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.3 INSTALLATION OF COPINGS

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements.
2. Interlock face-leg drip edge into continuous cleat anchored to substrate at manufacturer's required spacing that meets performance requirements. Anchor back leg of coping with screw fasteners and elastomeric washers at manufacturer's required spacing that meets performance requirements.

3.4 INSTALLATION OF ROOF-EDGE SPECIALITIES

A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.5 INSTALLATION OF ROOF-EDGE DRAINAGE-SYSTEM

A. Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.

B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 24 inches apart. Attach ends with rivets and seal with sealant to make watertight. Slope to downspouts.

1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion-joint caps.

C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.

1. Provide elbows at base of downspouts at grade to direct water away from building.
2. Connect downspouts to underground drainage system indicated.

3.6 INSTALLATION OF REGLETS AND COUNTERFLASHINGS

A. Coordinate installation of reglets and counterflashings with installation of base flashings.

B. Embedded Reglets: See [Section 033000 "Cast-in-Place Concrete"] [and] [Section 042000 "Unit Masonry"] for installation of reglets.

3.7 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Roof curbs.
2. Equipment supports.
3. Roof hatches.
4. Pipe and duct supports.
5. Pipe portals.

B. Related Requirements:

1. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.
2. Section 077100 "Roof Specialties" for manufactured fasciae, copings, gravel stops, gutters and downspouts, and counterflashing.

1.3 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

B. Sample Warranties: Work within a 5 year period after date of substantial completion.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.7 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion to include all accessories for tie-ins and penetrations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design roof curbs and equipment supports to comply with wind performance requirements, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Wind-Restraint Performance: As indicated on Drawings.

2.2 ROOF CURBS

A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, straight sides, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AES Industries, Inc.
b. Custom Solution Roof and Metal Products.
c. Greenheck Fan Corporation.
d. Kingspan Light + Air, North America.
e. Pate Company (The).
f. Roof Curb Systems.
g. Roof Products and Systems (RPS); a division of Hart & Cooley, Inc.
h. Thybar Corporation.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Supported Load Capacity: Coordinate load capacity with information on Shop Drawings of equipment to be supported.

D. Material: Zinc-coated (galvanized) steel sheet, 0.079 inch thick.

1. Finish: Factory prime coating.

E. Construction:

1. Curb Profile: Manufacturer's standard compatible with roofing system.
2. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
3. Fabricate curbs to minimum height of 24 inches above roofing surface unless otherwise indicated.
4. Top Surface: Level top of curb, with roof slope accommodated by sloping deck-mounting flange or by use of leveler frame.
5. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
6. Insulation: Factory insulated with 1-1/2-inch- thick glass-fiber board insulation.
7. Liner: Same material as curb, of manufacturer's standard thickness and finish.
8. Nailer: Factory-installed wood nailer along top flange of curb, continuous around curb perimeter.
9. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb, of size and spacing required to meet wind uplift requirements.
10. Platform Cap: Where portion of roof curb is not covered by equipment, provide weathertight platform cap formed from 3/4-inch- thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
11. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as curb.

2.3 EQUIPMENT SUPPORTS

A. Equipment Supports: Internally reinforced perimeter metal equipment supports capable of supporting superimposed live and dead loads between structural supports, including equipment loads and other construction indicated on Drawings, spanning between structural supports; capable of meeting performance requirements; with welded corner joints, integral metal cant, and integrally formed structure-mounting flange at bottom.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Curbs Plus, Inc.
b. Custom Solution Roof and Metal Products.
c. Greenheck Fan Corporation.
d. LMCurbs.
e. Milcor; Commercial Products Group of Hart & Cooley, Inc.
f. Pate Company (The).
g. Roof Curb Systems.
h. Roof Products and Systems (RPS); a division of Hart & Cooley, Inc.
i. Roof Products, Inc.
j. Thybar Corporation.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Supported Load Capacity: Coordinate load capacity with information on Shop Drawings of equipment to be supported.

D. Material: Aluminum sheet, 0.090 inch thick.

1. Finish: Aluminum Mill Finish.

E. Construction:

1. Curb Profile: Manufacturer's standard compatible with roofing system.
2. Insulation: Factory insulated with 1-1/2-inch- thick glass-fiber board insulation.
3. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.
4. Nailer: Factory-installed continuous wood nailers wide on top flange of equipment supports, continuous around support perimeter.
5. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb of size and spacing required to meet wind uplift requirements.
6. Platform Cap: Where portion of equipment support is not covered by equipment, provide weathertight platform cap formed from 3/4-inch- thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
7. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
8. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
9. Fabricate equipment supports to minimum height of 24 inches above roofing surface unless otherwise indicated.
10. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.

2.4 ROOF HATCHES

A. Roof Hatches: Metal roof-hatch units with lids and insulated single-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Acudor Products, Inc.
b. Architectural Specialties, Inc.
c. Babcock-Davis.
d. BILCO Company (The).
e. JL Industries, Inc.; a division of the Activar Construction Products Group.
f. Milcor; Commercial Products Group of Hart & Cooley, Inc.
g. Nystrom, Inc.

B. Type and Size: Single-leaf lid, 30 by 36 inches 30 by 96 inches.

C. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.

D. Hatch Material: Aluminum sheet.

1. Thickness: Manufacturer's standard thickness for hatch size indicated.
2. Finish: Clear anodic.

E. Construction:

1. Insulation: 2-inch- thick, polyisocyanurate board.

a. R-Value: 12.0 according to ASTM C1363.

2. Nailer: Factory-installed wood nailer continuous around hatch perimeter.
3. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
4. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
5. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
6. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.

F. Hardware: Spring operators, hold-open arm, stainless steel spring latch with turn handles, stainless steel butt- or pintle-type hinge system, and padlock hasps inside and outside.

1. Provide two-point latch on lids larger than 84 inches.
2. Provide remote-control operation.

G. Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.

1. Height: 42 inches above finished roof deck.
2. Posts and Rails: Galvanized-steel pipe, 1-1/4 inches in diameter or galvanized-steel tube, 1-5/8 inches in diameter.
3. Flat Bar: Galvanized steel, 2 inches high by 3/8 inch thick.

4. Maximum Opening Size: System constructed to prevent passage of a sphere 21 inches in diameter.
5. Chain Passway Barrier: Galvanized proof coil chain with quick link on fixed end.
6. Self-Latching Gate: Fabricated of same materials and rail spacing as safety railing system. Provide manufacturer's standard hinges and self-latching mechanism.
7. Post and Rail Tops and Ends: Weather resistant, closed or plugged with prefabricated end fittings.
8. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members.
9. Fabricate joints exposed to weather to be watertight.
10. Fasteners: Manufacturer's standard, finished to match railing system.
11. Finish: Manufacturer's standard.

    a. Color: As selected by Architect from manufacturer's full range.

2.5 PIPE AND DUCT SUPPORTS

A. Curb-Mounted Pipe Supports: Galvanized steel support with welded or mechanically fastened and sealed corner joints,and integrally formed deck-mounting flange at perimeter bottom; with adjustable-height roller-bearing pipe support accommodating up to diameter pipe or conduit and with provision for pipe retainer; as required for quantity of pipe runs and sizes.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. MIRO Industries.
    b. Pate Company (The).
    c. PHP Systems/Design.
    d. Thaler Metal Industries Ltd.

B. Duct Supports: Extruded-aluminum, urethane-insulated supports, 2 inches in diameter; with manufacturer's recommended hardware for mounting to structure or structural roof deck.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Thaler Metal Industries Ltd.

2. Finish: Mill finish.

2.6 PIPE PORTALS

A. Curb-Mounted Pipe Portal: Insulated roof-curb units with welded or mechanically fastened and sealed corner joints, stepped integral metal cant raised the thickness of roof insulation, and integrally formed deck-mounting flange at perimeter bottom; with weathertight curb cover with single or multiple collared openings and pressure-sealed conically shaped EPDM protective rubber caps sized for piping indicated, with stainless steel snaplock swivel clamps.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Roof Products and Systems (RPS); a division of Hart & Cooley, Inc.

B. Flashing Pipe Portal: Formed aluminum membrane-mounting flashing flange and sleeve with collared opening and pressure-sealed conically shaped EPDM protective rubber cap sized for piping indicated, with stainless steel snaplock swivel clamps.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Roof Products and Systems (RPS); a division of Hart & Cooley, Inc.

2.7 METAL MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 coating designation and mill phosphatized for field painting where indicated.

1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
3. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A755/A755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight.

4. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils.
5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.

B. Aluminum Sheet: ASTM B209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Mill Finish: As manufactured.
2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
3. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
4. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
5. Exposed Coil-Coated Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Two-Coat Fluoropolymer Finish: AAMA 2605. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight.

6. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

7. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.

C. Aluminum Extrusions and Tubes: ASTM B221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.

D. Stainless Steel Sheet and Shapes: ASTM A240/A240M or ASTM A666, Type 304.

E. Steel Shapes: ASTM A36/A36M, hot-dip galvanized according to ASTM A123/A123M unless otherwise indicated.

F. Steel Tube: ASTM A500/A500M, round tube.

G. Galvanized-Steel Tube: ASTM A500/A500M, round tube, hot-dip galvanized according to ASTM A123/A123M.

H. Steel Pipe: ASTM A53/A53M, galvanized.

2.8 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.

C. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, and complying with AWPA C2; not less than 1-1/2 inches thick.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

E. Underlayment:

1. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

F. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

G. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

H. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

I. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

J. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.

2.9 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Roof Curb Installation: Install each roof curb so top surface is level.

C. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.

D. Roof-Hatch Installation:

1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
2. Attach safety railing system to roof-hatch curb.
3. Attach ladder-assist post according to manufacturer's written instructions.

E. Pipe Support Installation: Comply with MSS SP-58 and MSS SP-89. Install supports and attachments as required to properly support piping. Arrange for grouping of parallel runs of horizontal piping, and support together.

1. Pipes of Various Sizes: Space supports for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

F. Seal joints with elastomeric butyl sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

A. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting."

B. Clean exposed surfaces according to manufacturer's written instructions.

C. Clean off excess sealants.

D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Urethane joint sealants.
   2. Butyl joint sealants.
   3. Latex joint sealants.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data:

   1. Joint-sealants.
   2. Joint sealant backing materials.

B. Samples for Initial Selection: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Joint-Sealant Schedule: Include the following information:

   1. Joint-sealant application, joint location, and designation.
   2. Joint-sealant manufacturer and product name.
   3. Joint-sealant formulation.
   4. Joint-sealant color.

1.4 CLOSEOUT SUBMITTALS

A. Warranty Documentation:

   1. Manufacturers' special warranties.
   2. Installer's special warranties.

1.5 QUALITY ASSURANCE

A. Qualifications:

   1. Installers: Authorized representative who is trained and approved by manufacturer.
   2. Testing Agency: Qualified in accordance with ASTM C1021 to conduct the testing indicated.

1.6 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint sealants from single manufacturer for each sealant type.

2.2 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, [provide products by the following][provide products by one of the following][available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

    a. Everkem Diversified Products, Inc.
    b. Pecora Corporation.
    c. Sika Corporation; Joint Sealants.
    d. Tremco Incorporated.

2.4 LATEX JOINT SEALANTS

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Everkem Diversified Products, Inc.
    b. Franklin International.
    c. Pecora Corporation.
    d. Sherwin-Williams Company (The).
    e. Tremco Incorporated.

2.5 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

1. Manufacturers: Subject to compliance with requirements, [provide products by the following][provide products by one of the following][available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

    a. Alcot Plastics Ltd.
    b. Construction Foam Products; a division of Nomaco, Inc.

B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.
    d. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.

c. Porcelain enamel.
d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.
4. Provide flush joint profile at in accordance with Figure 8B in ASTM C1193.

5. Provide recessed joint configuration of recess depth and at in accordance with Figure 8C in ASTM C1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

    a. Extent of Testing: Test completed and cured sealant joints as follows:

        1) Perform 10 tests for the first 1000 ft.of joint length for each kind of sealant and joint substrate.
        2) Perform one test for each 1000 ft. of joint length thereafter or one test per each floor per elevation.

    b. Test Method: Test joint sealants in accordance with Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.

        1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

    c. Inspect tested joints and report on the following:

        1) Whether sealants filled joint cavities and are free of voids.
        2) Whether sealant dimensions and configurations comply with specified requirements.
        3) Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.

    d. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
    e. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

2. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

C. Prepare test and inspection reports.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

A. Exterior joints in horizontal traffic surfaces JS-#1:

1. Joint Locations:
   a. Isolation and contraction joints in cast-in-place concrete slabs.
   b. Other joints as indicated on Drawings.
2. Joint Sealant: Urethane, M, P, 50, T, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Exterior joints in vertical surfaces and horizontal non-traffic surfaces[JS-3]:

1. Joint Locations:
   a. Construction joints in cast-in-place concrete.
   b. Control and expansion joints in unit masonry.
   c. Joints between metal panels.
   d. Joints between different materials listed above.
   e. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
   f. Control and expansion joints in ceilings and other overhead surfaces.
   g. Other joints as indicated on Drawings.
2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
3. Joint-Sealant Color: As indicated by manufacturer's designations.

C. Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement:

1. Joint Locations:
   a. Perimeter joints between interior wall surfaces and frames of interior doors windows.
   b. Other joints as indicated on Drawings.
2. Joint Sealant: Acrylic latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION

SECTION 085656 – SECURITY SCREENS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

B. Fixed security box and screens for over new skylightsRelated Sections:

1. SECTION 086200 - UNIT SKYLIGHTS

C. Submittals

D. Manufacturer shall submit shop drawings, showing details of attachment to surround materials and elevations showing scope of the project.

E. Samples of materials may be requested without cost to owner: frame sections, infill sections, fasteners, corner section, etc.

1.3 Warranty

PART 2 - The operation of the security screen is warranted for one (1) year against any proven defective material or parts, as called for in the specifications and approved shop drawings. **PRODUCTS**

2.1 Acceptable Manufacturers

A. Kane Innovations, Erie, PA
1. 833-272-5263
2. www.kaneinnovations.com
3. BOD Narrowline Steel Fixed – S-NR5-Z

B. Harmony Security Products, Inc.
1. 717-767-2779
2. www.harmonysecurityscreens.com

2.2 Main Frame

A. The main frame rails shall be not less than 16-gauge 2" [25.4mm] x 2" [25.4mm] seamless welded galvanized steel tubing with high strength die cast metal corners which are pneumatically inserted into the frame ends with an interference fit.

B. A removable face plate, extruded from 6063-T6 aluminum alloy, .062-inch thick, .212 lbs./ft., shall be attached to the sides of the main frame using tamper resistant screws.

2.3 Finish

A. The aluminum faceplates shall be thoroughly cleaned in a 5-step bonderizing process. An electrostatically applied thermoplastic, polyester powder coating (2.5 mil min. thickness) shall be applied and baked to a hard mar-resistant finish in one of Kane's standard colors. Coating shall meet or exceed AAMA 2603.

1. Color: Gray

B. The main and infill shall be thoroughly cleaned in a 5-step bonderizing process. An electrostatically applied gray, thermoplastic, polyester powder coating (2.5 mil min. thickness) shall be applied and baked to a hard mar-resistant finish. Coating shall meet or exceed AAMA 2603.

2.4 Infill

1. *Perforated Panel*
   a. 16-gauge mill-galvannealed with 63% open area

2.5 Infill Attachment

A. The perforated panel shall be attached to the main frame with hex-head Tek Screws.

B. Wire cloth shall be hemmed 180 degrees and retained by Hex-head Tek Screws. (for 12 mesh .028 wire cloth only)

C. Hex-head Tek screws shall penetrate the infill and main frame approximately 4" [101.6] on center.

PART 3 - **EXECUTION**

3.1 Inspection

A. Verify that openings fit allowable tolerances, are plumb, level, provide a solid anchoring surface and comply with approved shop drawings.

3.2 Installation

A. Install in accordance with approved shop drawings and specifications.

B. Plumb and align faces in a single plane and erect screens square and true, adequately anchored to structure.

C. After completion of installation, screens shall be adjusted, in working order and cleaned.

SECTION 086200 - UNIT SKYLIGHTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Domed curb-mount custom size unit skylights mounted on site-erected curbs.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of unit skylight.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for unit skylights.
2. Electric Motors: Show nameplate data, power requirements, ratings, characteristics, and mounting arrangements.

B. Shop Drawings: For unit skylight work.

1. Include plans, elevations, sections, details, and connections to supporting structure and other adjoining work.
2. Manual Operators: Show locations, mounting, and details for installing operator controls.
3. Solar Operators: Show locations, mounting, and details for installing operator controls.
4. Motor Operators: Show locations and details for installing operator components, switches, and controls. Indicate motor size and electrical characteristics.

    a. Wiring Diagrams: For power, signal, and control wiring for electric motors of operable unit skylights.

5. Multiple Units: Methods of connection and structural support for multiple units clustered together.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer and manufacturer.

B. Product Test Reports: For each type and size of unit skylight, for tests performed within the last four years by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For unit skylights to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating unit skylights that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.

B. Installer Qualifications: An installer acceptable to unit skylight manufacturer for installation of units required for this Project.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of unit skylights that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Uncontrolled water leakage.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
c. Breakage of polycarbonate glazing.

2. Warranty Period: Five years from date of manufacture with remaining time transferred to Owner on date of Substantial Completion.
3. No Leak Warranty: 10 years from date of manufacture with remaining time transferred to Owner on date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Unit Skylight Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Certification: AAMA-, WDMA-, or CSA-certified unit skylights with label attached to each.

2.2 DOMED UNIT SKYLIGHTS

A. General: Provide factory-assembled unit skylights that include glazing, extruded-aluminum glazing retainers, gaskets, extruded 100 percent thermally broken aluminum frame with condensation management and counterflashing for mounting on roof curbs with roof pitches between 0 and 60 degrees, and accessories as needed to withstand performance requirements indicated.

B. Basis-of-Design Product: Subject to compliance with requirements, provide VELUX America LLC; CT curb mount dome skylight or comparable product by one of the following:

1. Plasteco, Inc.
2. Skyline Sky-Lites, LLC.
3. Sunglo Skylight Products.

C. Unit Shape and Size: 37" x 37" Verify in field.

D. Polycarbonate Glazing: Thermoformable, extruded monolithic sheets, UV resistant, burglar-resistance rated according to UL 972, and with average impact strength of 12 to 16 ft-lb/in. of width when tested according to ASTM D 256, Test Method A (Izod).

1. Double-Glazing Profile: Dome, 25 percent rise.

a. Thicknesses: Not less than thicknesses required to exceed performance requirements.
b. Inner Glazing Color: White, translucent.
c. Outer Glazing Color: Colorless, transparent.

2. Self-Ignition Temperature: 650 deg F or more for plastic sheets in thickness indicated when tested according to ASTM D 1929.
3. Smoke-Production Characteristics: Smoke-developed index of 450 or less when tested according to ASTM E 84, and smoke density of 75 or less when tested according to ASTM D 2843
4. Burning Characteristics: Tested according to ASTM D 635. Class CC1, burning extent of 1 inch or less for nominal thickness of 0.060 inch or thickness indicated for use.

E. Integral Curb: Extruded-aluminum, self-flashing type.

1. Extruded-Aluminum Shapes: ASTM B 221, alloy and temper to suit structural and finish requirements but with not less than the strength and durability of Alloy 6063-T52.
2. Height: 12 inches.
3. Construction: Double wall.
4. Insulation: Manufacturer's standard rigid or semirigid type.

a. Exposed Insulation: Cover face of insulation exposed to interior of building with aluminum liner.

F. Condensation Control: Fabricate unit skylights with integral internal gutters and nonclogging weeps to collect and drain condensation to the exterior.

G. Thermal Break: Fabricate unit skylights with thermal barrier separating exterior and interior metal framing.

2.3 ACCESSORY MATERIALS

A. Fasteners: Same metal as metal being fastened, nonmagnetic stainless steel, or other noncorrosive metal as recommended by manufacturer. Finish exposed fasteners to match material being fastened.

1. Where removal of exterior exposed fasteners might allow access to building, provide nonremovable fastener heads.

2.4 ALUMINUM FINISHES

A. Mill Finish: Manufacturer's standard.

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
3. Galvanized Steel Sheet:

a. Baked-Enamel or Powder-Coat Finish: AAMA 2604 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1) Color and Gloss: Neutral gray.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Coordinate installation of unit skylight with installation of substrates, vapor retarders, roof insulation, roofing membrane, and flashing as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight.

B. Comply with recommendations in AAMA 1607 and with manufacturer's written instructions for installing unit skylights.

C. Install unit skylights level, plumb, and true to line, without distortion.

D. Anchor unit skylights securely to supporting substrates.

E. Where aluminum surfaces of unit skylights will contact another metal or corrosive substrates, such as preservative-treated wood, apply bituminous coating on concealed metal surfaces or provide other approved permanent separation recommended in writing by unit skylight manufacturer.

3.3 FIELD QUALITY CONTROL

A. After completion of installation and nominal curing of sealant and glazing compounds but before installation of interior finishes, test for water leaks according to AAMA 501.2.

B. Perform test for total area of each unit skylight.

C. Work will be considered defective if it does not pass tests and inspections.

D. Additional testing and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Prepare test and inspection reports.

3.4 CLEANING

A. Clean exposed unit skylight surfaces according to manufacturer's written instructions. Touch up damaged metal coatings and finishes.

B. Remove excess sealants, glazing materials, dirt, and other substances.

C. Remove and replace glazing that has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Protect unit skylight surfaces from contact with contaminating substances resulting from construction operations.

E. Unit Skylight Operating System: Clean and lubricate joints and hardware. Adjust for proper operation.

END OF SECTION

SECTION 099113.71 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following exterior substrates:

1. Concrete.
2. Steel.
3. Galvanized metal.

B. Related Requirements:

1. Section 099600 "High-Performance Coatings" for tile-like coatings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Indicate VOC content.

1.4 CLOSEOUT SUBMITTALS

A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacture's label with the following information:

1. Product name and type (description).
2. Batch date.
3. Color number.
4. VOC content.
5. Environmental handling requirements.
6. Surface preparation requirements.
7. Application instructions.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.

D. Hazardous Materials: Hazardous materials including lead paint may be present in buildings and structures to be painted. A report on the presence of known hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified.
2. Perform preparation for painting of substrates known to include lead paint in accordance with EPA Renovation, Repair and Painting Rule and additional requirements of authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company (The); products indicated or comparable product from one of the following:

1. Benjamin Moore & Co.
2. PPG Architectural Coatings.
3. Valspar Corporation - Architectural (Pro).

B. Comparable Products: Comparable products of approved manufacturers will be considered in accordance with Section 016000 "Product Requirements," and the following:

1. Products are approved by manufacturer in writing for application specified.
2. Products meet performance and physical characteristics of basis of design product including published ratio of solids by volume, plus or minus two percent.

C. Source Limitations: Obtain paint materials from single source from single listed manufacturer.

1. Manufacturer's designations listed on a separate color schedule are for color reference only and do not indicate prior approval.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content: For field applications, provide paints and coatings that complies with VOC content limits of authorities having jurisdiction.

C. Colors: As selected by Architect from manufacturer's full range.

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.

3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.

1. Report, in writing, conditions that may affect application, appearance, or performance of paint.

B. Substrate Conditions:

1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

a. Concrete: 12 percent.
b. Fiber-Cement Board: 12 percent.
c. Masonry (Clay and CMU): 12 percent.
d. Wood: 15 percent.

2. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
3. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

C. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 3, "Power Tool Cleaning."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Paint entire exposed surface of window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Concrete, Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: Primer sealer, latex.

1) S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.

b. Prime Coat: Latex, exterior, matching topcoat.
c. Intermediate Coat: Latex, exterior, matching topcoat.

d. Topcoat: Latex, exterior, gloss.

1) S-W A-100 Exterior Latex Gloss, A8 Series, at 4.0 mils wet, 1.3 mils dry, per coat.

B. Concrete Substrates, Pedestrian Traffic Surfaces:

1. Latex Floor Paint System:

a. First Coat: Floor paint, latex, slip-resistant, matching topcoat.
b. Topcoat: Floor paint, latex, slip-resistant, low gloss.

1) S-W ArmorSeal Tread-Plex, B90 Series, at 1.5 to 2.0 mils dry per coat.

C. CMU Substrates:

1. Latex System:

a. Block Filler: Block filler, latex, interior/exterior:

1) S-W PrepRite Block Filler, B25W25, at 75 to 125 sq. ft. per gal..

b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, gloss.

1) S-W A-100 Exterior Latex Gloss, A8 Series, at 4.0 mils wet, 1.3 mils dry, per coat.

D. Ferrous Metal, Galvanized-Metal, and Aluminum Substrates:

1. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, water based.

1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.

b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
c. Topcoat: Light industrial coating, exterior, water based, gloss.

1) S-W Pro Industrial Acrylic Gloss Coating, B66-600 Series, at 2.5 to 4.0 mils dry, per coat.

E. Wood Substrates: Including exposed wood items not indicated to receive shop-applied finish.

1. Latex System:

a. Prime Coat: Primer, latex for exterior wood.

1) S-W Exterior Latex Primer, B42, at 4.0 mils wet, 1.4 mils dry, per coat.

b. Intermediate Coat: Latex, exterior, matching topcoat.

c. Topcoat: Latex, exterior, gloss:

1) S-W A-100 Exterior Latex Gloss, A8 Series, at 4.0 mils wet, 1.3 mils dry, per coat.

F. Wood Substrates, Pedestrian Traffic Surfaces:

1. Latex Floor Paint System:

a. First Coat: Floor paint, latex, slip-resistant, matching topcoat.
b. Topcoat: Floor paint, latex, slip-resistant, low gloss:

1) S-W ArmorSeal Tread-Plex, B90 Series, at 1.5 to 2.0 mils dry per coat.

G. Plastic Trim Fabrication Substrates: Including architectural PVC, plastic, and fiberglass items.

1. Latex System:

a. Prime Coat: Primer, bonding, water-based:

1) S-W PrepRite ProBlock Latex Primer/Sealer, B57-620 Series, at 4.0 mils wet, 1.4 mils dry.

b. Intermediate Coat: Latex, exterior, matching topcoat.

c. Topcoat: Latex, exterior, semi-gloss:

1) S-W Solo Acrylic Semi-Gloss, A76 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

H. Exterior Gypsum Board Substrates:

1. Latex System:

a. Prime Coat: Primer bonding, water-based.

1) S-W PrepRite ProBlock Latex Primer/Sealer, B57-620 Series, at 4.0 mils wet, 1.4 mils dry.

b. Intermediate Coat: Latex, exterior, matching topcoat.

c. Topcoat: Latex, exterior, semi-gloss.

1) S-W Solo Acrylic Semi-Gloss, A76 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

I. Exterior Insulation Finish Systems (EIFS):

1. Latex System:

a. First Coat: Latex, exterior, matching topcoat.

b. Topcoat: Latex, exterior, semi-gloss:

1) S-W Solo Acrylic Semi-Gloss, A76 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

END OF SECTION

SECTION 099123.71 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete.
2. Concrete masonry units (CMU).
3. Steel.
4. Galvanized metal.
5. Aluminum (not anodized or otherwise coated).
6. Wood.
7. Gypsum board.

B. Related Requirements:

1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this section.
2. Section 099113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Indicate VOC content.

1.4 CLOSEOUT SUBMITTALS

A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials[**, from the same product run,**] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 2 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacturer's label with the following information:

1. Product name and type (description).
2. Batch date.
3. Color number.
4. VOC content.
5. Environmental handling requirements.
6. Surface preparation requirements.
7. Application instructions.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Lead Paint: It is not expected that lead paint will be encountered in the Work.

1. If suspected lead paint is encountered, do not disturb; immediately notify Architect and Owner.

D. Lead Paint: Lead paint may be present in buildings and structures to be painted. A report on the presence of lead paint is on file for review and use. Examine report to become aware of locations where lead paint is present.

1. Do not disturb lead paint or items suspected of containing hazardous materials except under procedures specified.
2. Perform preparation for painting of substrates known to include lead paint in accordance with EPA Renovation, Repair and Painting Rule and additional requirements of authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company (The); products indicated or comparable product from one of the following:

1. Benjamin Moore & Co.
2. PPG Architectural Coatings.
3. Pratt & Lambert.
4. Valspar Corporation - Architectural (Pro).

B. Comparable Products: Comparable products of approved manufacturers will be considered in accordance with Section 016000 "Product Requirements," and the following:

1. Products are approved by manufacturer in writing for application specified.
2. Products meet performance and physical characteristics of basis of design product including published ratio of solids by volume, plus or minus two percent.

C. Source Limitations: Obtain paint materials from single source from single listed manufacturer.

1. Manufacturer's designations listed on a separate color schedule are for color reference only and do not indicate prior approval.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall provide materials that comply with VOC limits of authorities having jurisdiction and for interior paints and coatings applied at Project site, the following VOC limits exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Primers, Sealers, and Undercoaters: 200 g/L.
4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
5. Floor Coatings: 100 g/L.
6. Shellacs, Clear: 730 g/L.

7. Shellacs, Pigmented: 550 g/L.

C. Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.

1. Report, in writing, conditions that may affect application, appearance, or performance of paint.

B. Substrate Conditions:

1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

a. Concrete: 12 percent.
b. Masonry (Clay and CMU): 12 percent.
c. Wood: 15 percent.
d. Gypsum Board: 12 percent.

2. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
3. Plaster Substrates: Verify that plaster is fully cured.
4. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

C. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

1. Concrete Floors: Remove oil, dust, grease, dirt, and other foreign materials. Comply with SSPC-SP-13/NACE 6 or ICRI 03732.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:
   a. Uninsulated metal piping.
   b. Uninsulated plastic piping.
   c. Pipe hangers and supports.
   d. Metal conduit.
   e. Plastic conduit.
   f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

2. Paint the following work where exposed in occupied spaces:
   a. Uninsulated metal piping.
   b. Uninsulated plastic piping.
   c. Pipe hangers and supports.
   d. Metal conduit.
   e. Plastic conduit.
   f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
   g. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces and Clay Masonry:

1. Latex System:

a. Prime Coat: Primer, latex, interior.

1) S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.

b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, eggshell.

1) S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat .

2. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer sealer, latex, interior:

1) S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.

b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based, semi-gloss:

1) S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

3. Concrete Stain System (Water-based) for Vertical Surfaces:

a. First Coat:

1) S-W H&C Colortop Water-Based Solid Color Concrete Stain, at 50 to 300 sq. ft. per gal..

b. Second Coat:

1) S-W H&C Colortop Water-Based Solid Color Concrete Stain, at 50 to 300 sq. ft. per gal..

B. Concrete Substrates, Pedestrian Traffic Surfaces:

1. Latex Floor Enamel System:

a. First Coat: Floor paint, latex, slip-resistant, matching topcoat.
b. Topcoat: Floor paint, latex, slip-resistant, low gloss: S-W ArmorSeal Tread-Plex, B90 Series, at 1.5 to 2.0 mils dry per coat.

2. Clear Acrylic System, Gloss Finish:

a. First Coat:

1) S-W H&C Clarishield Water-Based Wet-Look Concrete Sealer, at 100 to 200 sq. ft. per gal..

b. Second Coat:

1) S-W H&C Clarishield Water-Based Wet-Look Concrete Sealer, at 100 to 200 sq. ft. per gal..

3. Concrete Stain System (Water-based):

a. First Coat: Low-luster opaque finish:

1) S-W H&C Colortop Water-Based Solid Color Concrete Stain, at 50 to 300 sq. ft. per gal..

b. Second Coat: Low-luster opaque finish:

1) S-W H&C Colortop Water-Based Solid Color Concrete Stain, at 50 to 300 sq. ft. per gal..

4. Epoxy and Urethane Coatings: Refer to Section 099600 "High-Performance Coatings."
5. Epoxy- and Urethane- Based Aggregate-Filled Floor Surfacing: Refer to Section 096723 "Resinous Flooring."

C. CMU Substrates:

1. Latex System:

a. Block Filler: Block filler, latex, interior/exterior:

1) S-W PrepRite Block Filler, B25W25, at 75-125 sq. ft. per gal..

b. Intermediate Coat: Latex, interior, matching topcoat.

D. Metal Substrates (Aluminum, Steel, Galvanized Steel):

1. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, rust-inhibitive, water based:

1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.

b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based, semi-gloss:

1) S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

2. Waterbased/Alkyd Urethane System:

a. Prime Coat:

1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.

b. Intermediate Coat: Water-based acrylic-alkyd, interior, matching topcoat.
c. Topcoat: Water-based alkyd-urethane, semi-gloss, interior:

1) S-W Pro Industrial Waterbased Alkyd Urethane Semi-Gloss, B53-1150 Series, at 4.0 mils wet, 1.4 mils dry, per coat.

d. Topcoat: Water-based alkyd-urethane, gloss, interior:

1) S-W Pro Industrial Waterbased Alkyd Urethane Gloss, B53-1050 Series, at 4.0 mils wet, 1.4 mils dry, per coat.

E. Wood Substrates: Including exposed wood items not indicated to receive shop-applied finish.

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior:

1) S-W PrepRite ProBlock Primer Sealer, B51-620 Series, at 4.0 mils wet, 1.4 mils dry.

b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, eggshell:

1) S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.

d. Topcoat: Latex, interior, semi-gloss:

1) S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.

e. Topcoat: Latex, interior, gloss:

1) S-W ProMar 200 Zero VOC Gloss, B21-12650 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

2. Waterbased/Alkyd Urethane System:

a. Prime Coat: Primer sealer, latex, interior:

1) S-W Premium Wall & Wood Primer, B28W8111, at 4.0 mils wet, 1.8 mils dry.

b. Intermediate Coat: Water-based alkyd-urethane, interior, matching topcoat.
c. Topcoat: Water-based alkyd-urethane, semi-gloss, interior:

1) S-W Pro Industrial Waterbased Alkyd Urethane Semi-Gloss, B53-1150 Series, at 4.0 mils wet, 1.4 mils dry, per coat.

d. Topcoat: Water-based alkyd-urethane, gloss, interior:

1) S-W Pro Industrial Waterbased Alkyd Urethane Gloss, B53-1050 Series, at 4.0 mils wet, 1.4 mils dry, per coat.

3. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer sealer, latex, interior:

1) S-W PrepRite ProBlock Primer Sealer, B51-620 Series, at 4.0 mils wet, 1.4 mils dry.

b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based, eggshell:

1) S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

d. Topcoat: Light industrial coating, interior, water based, semi-gloss:

1) S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

4. Two-Component Epoxy and Epoxy High Build Systems: Refer to Section 099600 "High-Performance Coatings."

F. Gypsum Board and Spray-Texture Ceiling Substrates:

1. Latex System:

a. Prime Coat: Primer, latex, interior:

1) S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.0 mils dry.

b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, eggshell:

1) S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.

2. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer sealer, latex, interior:

1) S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.0 mils dry.

b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based, semi-gloss:

1) S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

3. Two-Component Epoxy and Epoxy High Build Systems for Non-Traffic Surfaces: Refer to Section 099600 "High-Performance Coatings."

END OF SECTION

SECTION 102213 - WIRE MESH PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Heavy-duty wire mesh partitions.

1.2 DEFINITIONS

A. Intermediate Crimp: Wires pass over one and under the next adjacent wire in both directions, with wires crimped before weaving and with extra crimps between the intersections.

B. Lock Crimp: Deep crimps at points of the intersection that lock wires securely in place.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Wire mesh partitions.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Indicate clearances required for operation of doors.

C. Samples for Verification: Panel constructed of specified frame members and wire mesh. Show method of finishing members at intersections.

1. Size: 12 by 12 inches.

D. Delegated Design Submittals: For wire mesh partitions indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates:

1. Welding certificates.

B. Qualification Statements: For Installer.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installers: Authorized representative who is trained and approved by manufacturer.
2. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:

a. AWS D1.1/D1.1M.
b. AWS D1.3/D1.3M.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver wire mesh items with cardboard protectors on perimeters of panels and doors and with posts wrapped palleted to provide protection during transit and Project-site storage. Use vented plastic.

B. Inventory wire mesh partition door hardware on receipt, and provide secure lockup for wire mesh partition door hardware delivered to Project site.

1. Tag each item or package separately with identification, and include basic installation instructions with each item or package.

1.7 Deliver keys to BCPS Project ManagerFIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of construction contiguous with wire mesh units by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Acorn Wire & Iron Works.
2. Folding Guard Corporation.
3. G-S Company (The).
4. Indiana Wire Products, Inc.
5. King Wire Partitions, Inc.
6. Miller Wire Works, Inc.
7. WireCrafters, LLC.

2.2 SOURCE LIMITATIONS

A. For wire mesh products, obtain each color, grade, finish, type, and variety from single source with resources to provide products of consistent quality in appearance and physical properties.

2.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design wire mesh units.

B. Structural Performance: Wire mesh units to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft. at any location on a panel.
2. Total load of 200 lbf applied uniformly over each panel.
3. Concentrated load and total load need not be assumed to act concurrently.

2.4 HEAVY-DUTY WIRE MESH PARTITIONS

A. Mesh:

1. 0.192-inch- diameter, intermediate-crimp steel wire woven into 2-inch diamond mesh.

B. Vertical and Horizontal Panel Framing: 1-1/2-by-3/4-by-1/8-inch cold-rolled steel channels; with holes for 3/8-inch- diameter bolts not more than 12 inches o.c.

C. Horizontal Panel Stiffeners: Two cold-rolled steel channels, 1 by 1/2 by 1/8 inch, bolted or riveted toe to toe through mesh.

D. Posts for 90-Degree Corners: 2-by-2-by-0.075-inch cold-rolled steel tubes, with holes for 3/8-inch- diameter bolts aligning with bolt holes in vertical framing; with 1/4-inch steel base plates.

E. Floor Shoes: Metal, not less than 2 inches high; sized to suit vertical framing, drilled for attachment to floor, and with setscrews for leveling adjustment.

F. Swinging Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/2-by-3/4-by-1/8-inch steel channels, banded with 1-1/2-by-1/8-inch flat steel bar cover plates on four sides, and with 1/8-inch- thick angle strike bar and cover on strike jamb.

1. Hinges: Full-surface type, 3-1/2-by-3-1/2-inch steel, three per door; bolted, riveted, or welded to door and jamb framing.
2. Cylinder Lock: Mortise type with manufacturer's standard cylinder; operated by key outside and lever inside; mounted at 36" AFF

G. Accessories:

1. Wall Clips: Manufacturer's standard, cold-rolled steel sheet; allowing up to 1 inch of adjustment.

H. Finish: Enamel finish Powder-coated finish unless otherwise indicated.

1. Color: As selected by Architect from manufacturer's full range.

2.5 FABRICATION

A. General: Fabricate wire mesh items from components of sizes not less than those indicated. Use larger-sized components as recommended by wire mesh item manufacturer. Furnish bolts, hardware, and accessories required for complete installation with manufacturer's standard finishes.

1. Fabricate wire mesh items to be readily disassembled.
2. Welding: Weld corner joints of framing and grind smooth, leaving no evidence of joint.

B. Heavy-Duty Wire Mesh Partitions: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.

1. Mesh: Securely clinch mesh to framing.
2. Framing: Fabricate framing with mortise-and-tenon corner construction.

    a. Provide horizontal stiffeners as indicated or, if not indicated, as required by panel height and as recommended by wire mesh partition manufacturer. Weld horizontal stiffeners to vertical framing.
    b. Fabricate three- and four-way intersections using manufacturer's standard connecting clips and fasteners.
    c. Fabricate partition and door framing with slotted holes for connecting adjacent panels.

3. Fabricate wire mesh partitions with 3 to 4 inches of clear space between finished floor and bottom horizontal framing.
4. Fabricate wire mesh partitions with bottom horizontal framing flush with finished floor.
5. Doors: Align bottom of door with bottom of adjacent panels.

    a. For doors that do not extend full height of partition, provide transom over door, fabricated from same mesh and framing as partition panels.

6. Hardware Preparation: Mortise, reinforce, drill, and tap doors and framing as required to install hardware.

C. Wire Mesh Stairway Partitions: Provide door jamb framing on each side of doors. Attach tamper shields centered behind exit devices.

2.6 STEEL AND IRON FINISHES

A. Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard enamel finish, suitable for use indicated, with a minimum dry film thickness of 2 mils.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

B. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-on powder-coat finish, suitable for use indicated, with a minimum dry film thickness of 2 mils.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine floors for suitable conditions where wire mesh items will be installed.

C. Examine walls to which wire mesh items will be attached for properly located blocking, grounds, and other solid backing for attachment of support fasteners.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF WIRE MESH PARTITIONS

A. Anchor wire mesh partitions to floor with 3/8-inch- diameter, postinstalled expansion anchors at 12 inches o.c. through anchor clips located at each post and corner. Shim anchor clips as required to achieve level and plumb installation.

1. Anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if indicated on Shop Drawings.

B. Anchor wire mesh partitions to floor with 3/8-inch- diameter, postinstalled expansion anchors at 12 inches o.c. through floor shoes located at each post and corner. Adjust wire mesh partition posts in floor shoes to achieve level and plumb installation.

1. Anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if indicated on Shop Drawings.

C. Anchor wire mesh partitions to walls at 12 inches o.c. through back corner panel framing and as follows:

1. For concrete and solid masonry anchorage, use expansion anchors.
2. For hollow masonry anchorage, use toggle bolts.
3. For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
4. For steel-framed gypsum board assemblies, use lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
5. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

D. Secure top capping bars to top framing channels with 1/4-inch- diameter, "U" bolts spaced not more than 28 inches o.c.

E. Provide line posts at locations indicated or, if not indicated, as follows:

1. On each side of sliding-door openings.
2. For partitions that are 7 to 9 ft. high, spaced at 15 to 20 ft. o.c.
3. For partitions that are 10 to 12 ft. high, located between every other panel.
4. For partitions that are more than 12 ft. high, located between each panel.

F. Provide seismic supports and bracing as indicated or, if not indicated, as recommended by manufacturer and as required for stability, extending and fastening members to supporting structure.

G. Where standard-width wire mesh partition panels do not fill entire length of run, provide adjustable filler panels to fill openings.

H. Install doors complete with door hardware.

I. Bolt accessories to wire mesh partition framing.

3.3 REPAIR

A. Repair Painting:

1. Wire brush and clean rust spots, welds, and abraded areas immediately after installation, and apply repair paint with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

2. Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

B. Repair of Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

3.4 ADJUSTING

A. Adjust doors to operate smoothly and easily, without binding or warping. Adjust hardware to function smoothly. Verify that latches and locks engage accurately and securely without forcing or binding.

3.5 PROTECTION

A. Remove and replace defective work, including doors and framing that are warped, bowed, or otherwise unacceptable.

END OF SECTION

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. The intent of the Division 22 specifications and the accompanying drawings is to provide a complete and workable plumbing system as shown, specified, and required by applicable codes. Include all work specified in Division 22 and shown on the accompanying drawings.

B. The drawings that accompany the Division 22 specifications are diagrammatic. They do not show every offset, bend, tee, or elbow which may be required to install work in the space provided and avoid conflicts. Follow the drawings as closely as is practical to do so and install additional bends, offsets and elbows where required by local conditions from measurements taken at the building, subject to approval, and at no additional cost to the Port.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 221316 - Sanitary Waste And Vent Piping

B. Section 221413 - Facility Storm Drainage Piping

C. Section 221423 - Storm Drainage Piping Specialties

1.3 REFERENCES

A. BT-OSHA: Baltimore Occupational Safety and Health Administration

1.4 SUBMITTALS

A. General:
   1. Comply with the requirements of Section 013300, Submittal Procedures, and the additional requirements specified herein.

B. Shop Drawings:
   1. The contract drawings indicate the general layout of the piping and various items of equipment. Coordination with other trades and with field conditions is required. For this purpose, submit shop drawings of all installations not detailed on the contract drawings, and of all changes to the contract drawings.

2. Shop drawings shall be new drawings prepared by the Contractor and shall not be reproductions or tracings of the contract drawings. Overlay drawings with shop drawings of other trades and check for conflicts. Shop drawings shall be the same size as the contract drawings with title blocks similar to the contract drawings. Shop drawings shall identify the related contract drawing number or related reference drawing. Shop drawings shall be fully dimensioned, including both plan and elevation dimensions. Do not use shop drawings to make scope changes.
3. Shop drawings shall include but not be limited to:
   a. Complete floor plans with plumbing to a minimum of 1/8" = 1'-0" scale.
   b. Plumbing of mechanical and fan rooms to a minimum of 1/4" = 1'-0" scale.
   c. Sections of congested areas to a minimum of 1/4" = 1'-0" scale.
   d. Fabricated equipment to a minimum of 1/4" = 1'-0" scale.
4. Submit shop drawings for review as required by the contract documents. Additional shop drawings may be requested when it appears that coordination issues are not being resolved in the field, or when there is a question as to whether contract documents are being complied with or the design intent is being met.

C. Product Data:
1. Submit product data for review on all scheduled pieces of equipment, equipment requiring electrical connections or connections by other trades, and as required by the contract documents. Include manufacturer's detailed shop drawings, specifications, and data sheets. Data sheets shall include capacities, RPM, BHP, pressure drop, design and operating pressures, temperatures and similar data. Manufacturer's abbreviations or codes are not acceptable.
2. List the name of the motor manufacturer and service factor for each piece of equipment.
3. Indicate equipment operating weights including bases and weight distribution at support points.
4. In the case of equipment specified by specific catalog number, such as wiring devices, time switches, valves, etc., a statement of conformance will suffice.

D. Operation and Maintenance Data:
1. Submit operation and maintenance data for review on all scheduled pieces of equipment, and as required by the contract documents.

E. Commissioning Documentation:
1. Submit commissioning plans, schedules, and related documentation in accordance with the contract documents.

1.5 QUALITY ASSURANCE

A. Materials shall be new. Work shall be of good quality, free of faults and defects.

B. All equipment shall fit in the space provided.

C. Systems shall be built and installed to deliver their full rated capacity at the efficiency for which they were designed.

D. The entire plumbing system shall operate at full capacity without objectionable noise or vibration.

E. Materials and Equipment:
   1. Each piece of equipment provided shall meet all detailed requirements of the drawings and specifications and shall be suitable for the installation.
   2. Where two or more units of the same class of equipment are provided, use products of the same manufacturer; component parts of the entire system need not be products of the same manufacturer.

F. Workmanship:
   1. Install all materials in a neat and workmanlike manner.
   2. Follow manufacturer's directions. If they are in conflict with the contract documents, obtain clarification before starting work.

G. Cutting and Patching:
   1. Cutting, patching and repairing for the proper installation and completion of the work specified in this division, including plastering, masonry work, concrete work, carpentry work, firestopping, and painting, shall be performed by skilled craftsmen of each respective trade in conformance with the appropriate division of work. Additional openings required in building construction shall be made by drilling or cutting.
   2. Fill holes which are cut oversize so that a tight fit is obtained around the objects passing through.
   3. Do not pierce beams or columns without permission of the Port and then only as directed.
   4. New or existing work that is cut or damaged shall be restored to its original condition. Where alterations disturb existing finishes, the surfaces shall be repaired, refinished and left in condition existing prior to commencement of work.

1.6 PROJECT CONDITIONS

A. Coordinate exact requirements governed by actual work conditions. Check all information and report any discrepancies before fabricating work. Report changes in time to avoid unnecessary work.

B. Comply with the requirements of Section 017000, Execution Requirements, for investigation prior to penetration of floor slabs.

1.7 PROVISIONS FOR LARGE EQUIPMENT

A. Make provisions for the necessary openings in the building to allow for admittance of all equipment.

PART 2 - PRODUCTS

2.1 PIPE AND DUCT SLEEVES

A. Interior Wall and Floor Sleeves: 18-gauge galvanized steel.

B. Exterior Wall Sleeves: Cast iron.

C. On-Grade Floor Sleeves: Cast iron.

2.2 FLOOR, WALL, AND CEILING PLATES

A. Provide stamped split-type plates as follows:
1. Floor Plates: Cast brass, chromium plated.
2. Wall and Ceiling Plates: Spun aluminum.

2.3 SEALANT

A. General Purpose: Tremco Dymeric Sealant, or equal.

B. Floor Penetration Sealant: Hydro Ban Sealant by Laticrete., or equal.

C. Firestop Sealant: See Section 078400.

D. All guards shall meet OR-OSHA requirements including back plates.

2.4 ELECTRICAL EQUIPMENT

A. General: All equipment and installed work shall be as specified under Division 26, Electrical.

2.5 SEALING

A. Seal below grade and between exterior piping and wall sleeves.

B. Use modular, elastomeric pipe sealing.
1. Material: EPDM.
2. Hardware: Stainless steel.
3. Acceptable Manufactures: Link-seal or equal.

PART 3 - EXECUTION

3.1 DEMOLITION AND SALVAGE

A. Prior to any demolition activities, coordinate safe-off of live utilities with the Port.

B. Remove or relocate plumbing piping, wiring, devices and other equipment encountered in existing areas affected by this work as indicated on the drawings.

C. Protect equipment identified to be salvaged. Remove salvaged equipment prior to demolition of adjacent services. Arrange with the Port for storage and return of salvaged equipment.

D. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations. Prior to demolition, verify that demolished services will not affect the operation of existing systems that are to remain and notify the Port.

E. Demolition Service/System Requirements:
   1. Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical systems serving areas to be selectively demolished.
   2. Demolish all service back to nearest active main or point of future connection as indicated. Verify with Port extent of demolition prior to proceeding if extent is not clear.
   3. The Port will arrange to shut off indicated services/systems when requested by the Contractor.
   4. If services/systems are required to be removed, relocated, or abandoned: Before proceeding with selective demolition, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
   5. Remove all accessories associated with removed utilities including supports, hangers, braces, clips, etc., in their entirety.
   6. Patch penetrations of walls and floors related to demolished services restoring existing fire separations, assembly ratings, and waterproofing membranes.

3.2 SYSTEM WATER DISPOSAL

A. Do not drain water from systems treated with chemicals into the sanitary or storm sewers without written approval from the Port.

3.3 ACCESS PANELS

A. Install in accordance with manufacturer’s recommendations, coordinated with architectural features. Review intended locations with the Port prior to installation.

3.4 SLEEVES

A. General:
1. Lay out work prior to concrete forming. Do all cutting and patching required. Reinforce sleeves to prevent collapse during forming and pouring.
2. Sleeve all core-drilled penetrations, unless detailed otherwise on the drawings.
3. Sleeves shall be large enough to allow clearance around pipe in accordance with NFPA 13. When pipe is insulated, insulation shall pass continuously through sleeve with 3/4-inch clearance between insulation and sleeve.

B. Interior Wall Sleeves:
1. Pack with fiberglass insulation.
2. Terminate sleeve flush with face of wall unless indicated otherwise.

C. Below-Grade Exterior Wall Sleeves: Sleeves shall be large enough to allow for Link seal and made watertight. Install link seal and size based on pipe and sleeve. Secure sleeves against displacement.

D. Above-Grade Exterior Wall Sleeves: Similar to interior wall sleeves, except caulk outside with sealant.

E. Sleeves Through Floors:
1. Floor sleeves shall extend 1 1/2 inch above finished floor, except waste stacks using carriers shall have sleeve flush with floor.
2. Do not support pipes by resting pipe clamps on floor sleeves. Provide supplementary members so pipes are floor-supported.
3. Make penetrations watertight by sealing gap between sleeve and the floor with floor penetration sealant as specified in Part 2.

F. Sleeves Through Fire-Rated Floors: Install the same as sleeves through floors, except:
1. Make penetrations through floor watertight by sealing gap between sleeve and floor with floor penetration sealant as specified in Part 2, and
2. Provide firestopping system both inside and outside of sleeve as specified in Section 078400 and in accordance with the recommendations of FM Global.

G. Sleeves Through Fire-Rated Walls: Provide firestopping system as specified in Section 078400 and in accordance with the recommendations of FM Global.

H. On-Grade Floor Sleeves: Same as for below-grade exterior wall sleeves, except caulked from inside.

I. Sleeves Through Roof: Extend 8 inches above roof.

3.5 FIRESTOPPING

A. Comply with the requirements of Section 078400.

B. Provide fire-rated assemblies at all penetrations of 1 hour or more.

3.6 CLEANING

A. Clean plumbing equipment, fixtures and piping of roof drains (except those required by codes), iron cuttings, and other refuse.

B. Clean scratched or marred painted surfaces of rust or other foreign matter and paint with matching color industrial enamel, except as otherwise noted.

3.7 EQUIPMENT PROTECTION

A. Keep plumbing pipe and conduit openings closed by means of plugs or caps to prevent the entrance of foreign matter. Protect plumbing piping, conduit, fixtures, equipment, and apparatus against dirty water, chemical, or mechanical damage both before and after installation. Restore damaged or contaminated piping, fixtures, equipment, or apparatus to original conditions or replace at no additional cost to the Port.

B. Protect bright finished shafts, bearing housings, and similar items until in service. No rust will be permitted.

C. Cover or otherwise suitably protect equipment and materials stored on the job site.

3.8 FLOOR, WALL AND CEILING PLATES

A. Install plates on piping passing through finished walls, floors, ceilings, partitions and plaster furrings. Plates shall completely cover opening around pipe and duct.

B. Secure wall and ceiling plates to pipe, insulation, or structure.

C. Plates shall not penetrate insulation vapor barriers.

D. Plates are not required in mechanical rooms or unfinished spaces.

3.9 ELECTRICAL EQUIPMENT

A. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in the dedicated electrical space around electrical equipment.

B. The area above the dedicated electrical space shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.

C. Protect outdoor electrical equipment from accidental spillage or leakage from piping systems.

3.10 EQUIPMENT CONNECTIONS

A. Make final connections to equipment in accordance with manufacturer's instructions, shop drawings, and as indicated.

B. Piping:
   1. Connections shall include hot and cold water, fuel and gas, compressed air, sanitary waste and vent, roof and overflow roof drains, and liquid grease.
   2. Provide easily accessible unions and gate valves in all piping at equipment, waste traps, and any other fittings required for complete installation.
   3. Piping connections shall be independently supported to prevent undue strain on equipment.

3.11 PAINTING

A. Comply with the requirements of Section 099100.

B. Equipment Rooms and Finished Areas:
   1. Insulation: Not painted.
   2. Miscellaneous Iron Work, Structural Steel Stands, Uninsulated Tanks, Equipment Bases: Paint one coat of black enamel.
   3. Steel Valve Bodies and Bonnets: Paint one coat of black enamel.
   4. Brass Valve Bodies: Not painted.
   5. Equipment Without Factory Finish: Paint one coat of grey machinery enamel. Do not paint nameplates.

C. Concealed Spaces (above ceilings, not visible):
   1. Insulation: Not painted.
   2. Hangers, Uninsulated Piping, Miscellaneous Iron Work, Valve Bodies and Bonnets: Not painted.

D. Exterior Black Steel: Wire brush and apply two coats of rust-inhibiting primer and one coat of grey exterior machinery enamel.

3.12 POWER-ACTUATED FASTENERS

A. Power-actuated fasteners are not allowed.

3.13 ADJUSTING AND CLEANING

A. Before operating equipment or systems, make thorough check to determine that systems have been flushed and cleaned as required and equipment has been properly installed, lubricated, and serviced. Check factory instructions to see that installations have been made properly and that recommended lubricants have been used.

B. Use particular care in lubricating bearings to avoid blowing out seals from over-lubrication. Check equipment for damage that may have occurred during shipment, after

delivery, or during installation. Repair damaged equipment or replace with new equipment as directed by the Port.

END OF SECTION 220500

SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Stack-sleeve fittings.
3. Sleeve-seal systems.
4. Sleeve-seal fittings.
5. Grout.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

G. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

2.2 STACK-SLEEVE FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Smith, Jay R. Mfg. Co.
2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.

B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. Metraflex Company (The).

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel.
3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Presealed Systems.

B. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Joint Sealants.

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Penetration Firestopping.

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Sheet Metal Flashing and Trim.
3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.

4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using grout, seal the space around outside of stack-sleeve fittings.

B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Penetration Firestopping.

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

   a. Piping Smaller Than NPS 6: Cast-iron wall sleeves.
   b. Piping NPS 6 and Larger: Cast-iron wall sleeves.

2. Exterior Concrete Walls below Grade:

   a. Piping Smaller Than NPS 6: Cast-iron wall sleeves with sleeve-seal system.

      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

   b. Piping NPS 6 and Larger: Cast-iron wall sleeves with sleeve-seal system.

      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs-on-Grade:

    a. Piping Smaller Than NPS 6: Cast-iron wall sleeves with sleeve-seal system.

        1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

    b. Piping NPS 6 and Larger: Cast-iron wall sleeves with sleeve-seal system.

        1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

4. Concrete Slabs above Grade:

    a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
    b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves.

5. Interior Partitions:

    a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
    b. Piping NPS 6 and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 220517

SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Brass ball valves.
   2. Bronze ball valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

G. SWP: Steam working pressure.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

   1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
   2. ASME B31.1 for power piping valves.

3. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, gate, and globe valves closed to prevent rattling.
4. Set ball and plug valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:
1. Handwheel: For valves other than quarter-turn types.
2. Handlever: For quarter-turn valves NPS 6 and smaller.

E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Gate Valves: With rising stem.
2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: With extended neck.

F. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Grooved: With grooves according to AWWA C606.
3. Solder Joint: With sockets according to ASME B16.18.
4. Threaded: With threads according to ASME B1.20.1.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRASS BALL VALVES

A. Two-Piece, Full-Port, Brass Ball Valves with Brass Trim:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. America
   b. Apollo
   c. Milwaukee Valve
   d. Nibco
   e. Stockham Valve and Fitting
   f. Victaulic
   g. Watts
   h. Walworth

2. Description:

   a. Standard: MSS SP-110.
   b. SWP Rating: 150 psig.
   c. CWP Rating: 600 psig.
   d. Body Design: Two piece.
   e. Body Material: Forged brass.
   f. Ends: Threaded.
   g. Seats: PTFE or TFE.
   h. Stem: Brass.
   i. Ball: Chrome-plated brass.
   j. Port: Full.

B. Two-Piece, Full-Port, Brass Ball Valves with Stainless-Steel Trim:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Jenkins Valves.
   c. Flow-Tek, Inc.; a subsidiary of Bray International, Inc.

2. Description:

   a. Standard: MSS SP-110.
   b. SWP Rating: 150 psig.
   c. CWP Rating: 600 psig.
   d. Body Design: Two piece.

e. Body Material: Forged brass.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Stainless steel.
i. Ball: Stainless steel, vented.
j. Port: Full.

2.3 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:

a. America
b. Apollo
c. Milwaukee Valve
d. Nibco
e. Stockham Valve and Fitting
f. Victaulic
g. Watts
h. Walworth

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Two piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Bronze.
i. Ball: Chrome-plated brass.
j. Port: Full.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.
2. Center-Guided and Plate-Type Check Valves: In horizontal or vertical position, between flanges.
3. Lift Check Valves: With stem upright and plumb.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.

3.5 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
2. Ball Valves: Two piece, full port, brass or bronze with brass] trim.

END OF SECTION 220523

SECTION 220529 - HANGERS AND SUPPORT FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Pipe positioning systems.
8. Equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Fiberglass strut systems.
4. Pipe stands.
5. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Design Calculations: Calculate requirements for designing trapeze hangers.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Allied Tube & Conduit.
    b. Cooper B-Line, Inc.
    c. Flex-Strut Inc.

2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
3. Standard: MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Metallic Coating: Electroplated zinc or Hot-dipped galvanized.
8. Paint Coating: Vinyl.
9. Plastic Coating: PVC.
10. Combination Coating: Insert coating materials in order of application.

B. Non-MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Anvil International; a subsidiary of Mueller Water Products Inc.
    b. Empire Industries, Inc.
    c. ERICO International Corporation.

2. Description: Shop- or field-fabricated pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Standard: Comply with MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.

6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Coating: Zinc.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Carpenter & Paterson, Inc.
2. Clement Support Services.
3. ERICO International Corporation.

B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.

C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig minimum compressive strength. Use of calcium silicate inserts is only acceptable for hot piping system.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.6 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand:

1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
2. Base: Stainless steel.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand:

1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
2. Bases: One or more; plastic.
3. Vertical Members: Two or more protective-coated-steel channels.
4. Horizontal Member: Protective-coated-steel channel.
5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.7 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.8 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.9 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.

G. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

H. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

K. Install lateral bracing with pipe hangers and supports to prevent swaying.

L. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

M. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

O. Insulated Piping:

1. Attach clamps and spacers to piping.

    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    b. NPS 4: 12 inches long and 0.06 inch thick.
    c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
    d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
    e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Exterior Painting.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and attachments for general service applications.

F. Use stainless-steel pipe hangers and attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal-hanger shield inserts for insulated piping and tubing.

J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.

13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.

4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.

8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

Q. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

R. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

S. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Stencils.
5. Valve tags.
6. Warning tags.

1.3 ACTION SUBMITTALS

A. LEED Submittals – Product data for Credit IEQ 4.1: For adhesives applied within the building waterproofing envelope, documentation including printed statement of VOC content in g/L.

B. Product Data: For each type of product indicated.

C. Samples: For color, letter style, and graphic representation required for each identification material and device.

D. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

E. Valve numbering scheme.

F. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch
3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive:
    a. VOC content not to exceed 250 g/L.
    b. Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: Black.
3. Background Color: White.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive:
    a. VOC content not to exceed 250 g/L.
    b. Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: White.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive:
1. VOC content not to exceed 250 g/L.
2. Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

2.4 STENCILS

A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; and minimum letter height of 3/4 inch for access panel and door labels, equipment labels, and similar operational instructions.
   1. Stencil Material: Aluminum.
   2. Stencil Paint: Exterior, gloss, alkyd enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
   3. Identification Paint: Exterior, alkyd enamel in colors according to ASME A13.1 unless otherwise indicated.

2.5 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

   1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
   2. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

   1. Valve-tag schedule shall be included in operation and maintenance data.

2.6 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

   1. Size: 3 by 5-1/4 inches minimum
   2. Fasteners: Brass grommet and wire.
   3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
   4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Interior Painting.

B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels with painted, color-coded bands or rectangles on each piping system.

1. Identification Paint: Use for contrasting background.
2. Stencil Paint: Use for pipe marking.

C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

D. Pipe Label Color Schedule:

1. Domestic Water Piping

a. Background: Blue.
b. Letter Colors: Black.

2. Sanitary Waste and Storm Drainage Piping:

a. Background Color: Green.
b. Letter Color: Black.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves ; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

a. Cold Water: 1-1/2 inches, round.
b. Hot Water: 1-1/2 inches, round.

2. Valve-Tag Colors:

a. Cold Water: Natural.
b. Hot Water: Natural.

3. Letter Colors:

a. Cold Water: Black.
b. Hot Water: Black.

3.5 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 220553

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Storm water piping exposed to freezing conditions.
3. Roof drains and rainwater leaders.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

B. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content and chemical components.
2. Product data for Credit IEQ 4.2: For mastics applied within the building water proofing envelope, documentation including printed statement of VOC content in g/L.
3. Laboratory Test Reports for Credit IEQ 4: For adhesives and sealants, documentation indicating that product complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

D. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Preformed Pipe Insulation Materials: 12 inches long by NPS 2.
2. Jacket Materials for Pipe: 12 inches long by NPS 2.
3. Sheet Jacket Materials: 12 inches square.
4. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Mockups: Before installing insulation, build mockups for each type of insulation and finish listed below to demonstrate quality of insulation application and finishes. Build mockups in the location indicated or, if not indicated, as directed by Architect. Use materials indicated for the completed Work.

1. Piping Mockups:

a. One 10-foot section of NPS 2 straight pipe.
b. One each of a 90-degree threaded, welded, and flanged elbow.
c. One each of a threaded, welded, and flanged tee fitting.
d. One NPS 2 or smaller valve, and one NPS 2-1/2 or larger valve.
e. Four support hangers including hanger shield and insert.

f. One threaded strainer and one flanged strainer with removable portion of insulation.
g. One threaded reducer and one welded reducer.
h. One pressure temperature tap.
i. One mechanical coupling.

2. For each mockup, fabricate cutaway sections to allow observation of application details for insulation materials, adhesives, mastics, attachments, and jackets.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Obtain Architect's approval of mockups before starting insulation application.
5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed.

D. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified Hangers and Supports for Plumbing Piping and Equipment.

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Armacell
   b. Certain-Teed Corporation
   c. Childers
   d. Foster
   e. Johns Manville
   f. Knauf Fiber Glass
   g. Owens-Corning

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Ramco Insulation, Inc.; Super-Stik.

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Ramco Insulation, Inc.; Thermokote V.

C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Ramco Insulation, Inc.; Ramcote 1200 and Quik-Cote.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-84.

2. For indoor applications, adhesive shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.

2. For indoor applications, adhesive shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.

2. For indoor applications, adhesive shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Phenolic Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-33.

2. For indoor applications, adhesive shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

F. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
   b. Eagle Bridges - Marathon Industries; 225.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-20.

2. For indoor applications, adhesive shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

G. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Dow Corning Corporation; 739, Dow Silicone.

2. For indoor applications, adhesive shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.

1. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
2. Service Temperature Range: 0 to 180 deg F.
3. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
4. Color: White.

D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.
b. Eagle Bridges - Marathon Industries; 570.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F.
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
b. Eagle Bridges - Marathon Industries; 550.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.
    b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
4. Service Temperature Range: 0 to plus 180 deg F.
5. Color: White.

2.6 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass and Phenolic Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
    b. Eagle Bridges - Marathon Industries; 405.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Permanently flexible, elastomeric sealant.
4. Service Temperature Range: Minus 100 to plus 300 deg F.
5. Color: White or gray.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
    b. Eagle Bridges - Marathon Industries; 405.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Glass-Fiber Fabric: Approximately 2 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in. for covering pipe and pipe fittings.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Chil-Glas Number 10.

B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for pipe.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Mast-A-Fab.
    b. Vimasco Corporation; Elastafab 894.

2.9 FIELD-APPLIED CLOTHS

A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd..

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Alpha Associates, Inc.; Alpha-Maritex 84215 and 84217/9485RW, Luben 59.

2.10 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Johns Manville; Zeston.
    b. P.I.C. Plastics, Inc.; FG Series.
    c. Proto Corporation; LoSmoke.

2. Adhesive: As recommended by jacket material manufacturer. VOC content not to exceed 250 g/L.
3. Color: White.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

    a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

C. Metal Jacket:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Metal Jacketing Systems.

b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.

2. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.

a. Sheet and roll stock ready for shop or field sizing.
b. Finish and thickness are indicated in field-applied jacket schedules.
c. Moisture Barrier for Indoor Applications: 1-mil- thick, heat-bonded polyethylene and kraft paper.
d. Factory-Fabricated Fitting Covers:

1) Same material, finish, and thickness as jacket.
2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
3) Tee covers.
4) Flange and union covers.
5) End caps.
6) Beveled collars.
7) Valve covers.
8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

D. Underground Direct-Buried Jacket: 125-mil- thick vapor barrier and waterproofing membrane consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Pittsburgh Corning Corporation; Pittwrap.
b. Polyguard Products, Inc.; Insulrap No Torch 125.

2.11 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ABI, Ideal Tape Division; 428 AWF ASJ.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
c. Compac Corporation; 104 and 105.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. ABI, Ideal Tape Division; 491 AWF FSK.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
   c. Compac Corporation; 110 and 111.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. ABI, Ideal Tape Division; 370 White PVC tape.
   b. Compac Corporation; 130.
   c. Venture Tape; 1506 CW NS.

2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. ABI, Ideal Tape Division; 488 AWF.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
   c. Compac Corporation; 120.

2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.12 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ITW Insulation Systems; Gerrard Strapping and Seals.
b. RPR Products, Inc.; Insul-Mate Strapping and Seals.

2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015 inch thick, 1/2 inch wide with wing seal or closed seal.
3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

C. Wire: 0.080-inch nickel-copper alloy.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. C & F Wire.

2.13 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Engineered Brass Company.
b. Insul-Tect Products Co.; a subsidiary of MVG Molded Products.
c. McGuire Manufacturing.

2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Truebro; a brand of IPS Corporation.
b. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.

2. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Penetration Firestopping for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Penetration Firestopping

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for

above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Exterior Painting and Interior Painting.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two

locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.10 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

1. NPS 1 and Smaller: Insulation shall be one of the following:
   a. Flexible Elastomeric: 1/2 inch thick.

2. NPS 1-1/4 and Larger: Insulation shall be one of the following:
   a. Flexible Elastomeric: 1 inch thick.

B. Domestic Hot Water:

1. NPS 1-1/4 and Smaller: Insulation shall be one of the following:
   a. Flexible Elastomeric: 3/4 inch thick.

2. NPS 1-1/2 and Larger: Insulation shall be one of the following:

   a. Flexible Elastomeric: 1 inch thick.

3.11 UNDERGROUND, FIELD-INSTALLED INSULATION JACKET

A. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION 220719

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Aboveground domestic water pipes, tubes, and fittings inside buildings.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

B. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

C. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:

B. Solder Filler Metals: ASTM B 32, lead-free alloys.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Meters and Gages for Plumbing Piping and with requirements for drain valves and strainers in Domestic Water Piping Specialties.

C. Install shutoff valve immediately upstream of each dielectric fitting.

D. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Domestic Water Piping Specialties.

E. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

F. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

G. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

H. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

I. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

J. Install piping to permit valve servicing.

K. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

L. Install piping free of sags and bends.

M. Install fittings for changes in direction and branch connections.

N. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

O. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gages in Meters and Gages for Plumbing Piping.

P. Install thermostats in hot-water circulation piping.

Q. Install thermometers on outlet piping from each water heater. Comply with requirements for thermometers in Meters and Gages for Plumbing Piping.

R. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Sleeves and Sleeve Seals for Plumbing Piping.

S. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Sleeves and Sleeve Seals for Plumbing Piping.

T. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Escutcheons for Plumbing Piping.

3.2 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.3 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. Fittings for NPS 1-1/2 and Smaller: Fitting-type coupling.
2. Fittings for NPS 2 and Larger: Sleeve-type coupling.

3.4 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings or nipples.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges or nipples.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in other sections.

B. Comply with requirements for pipe hanger, support products, and installation in Hangers and Supports for Plumbing Piping and Equipment.

1. Vertical Piping: MSS Type 8 or 42 clamps.
2. Individual, Straight, Horizontal Piping Runs:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
4. NPS 2-1/2: 108 inches with 1/2-inch rod.
5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
6. NPS 6: 10 feet with 5/8-inch rod.
7. NPS 8: 10 feet with 3/4-inch rod.

F. Install supports for vertical copper tubing every 10 feet.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.

3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
4. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.7 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Identification for Plumbing Piping and Equipment.

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

   a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
   b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

      1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
      2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

   c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
   d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

   a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
   b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
   c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
   e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
   f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.9 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibs.
2. Open shutoff valves to fully open position.
3. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

    a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
    b. Adjust calibrated balancing valves to flows indicated.

4. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
5. Remove and clean strainer screens. Close drain valves and replace drain plugs.
6. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.10 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Repeat procedures if biological examination shows contamination.
    e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.11 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Aboveground domestic water piping, NPS 2 and smaller, shall be one of the following:
   1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered joints.

3.12 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

   1. Shutoff Duty: Use ball or gate valves for piping NPS 2 and smaller.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Hose bibbs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For domestic water piping specialties.

   1. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 and NSF 14.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

B.

2.3 HOSE BIBBS

1. Hose Bibbs Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 1/2 or NPS 3/4 (DN 15 or DN 20) threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig (860 kPa).
7. Vacuum Breaker: Integral[or field-installation,] nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
9. Finish for Service Areas: [**Rough bronze**] [Chrome or nickel plated].
10. Finish for Finished Rooms: Chrome or nickel plated.
11. Operation for Equipment Rooms: Wheel handle or operating key.
12. Operation for Service Areas: [**Wheel handle**] [Operating key].
13. Operation for Finished Rooms: [**Wheel handle**] [Operating key].
14. Include operating key with each operating-key hose bibb.
15. Include[integral] wall flange with each chrome- or nickel-plated hose bibb.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
3. Do not install bypass piping around backflow preventers.

B. Install water regulators with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.

C. Install water-control valves with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.

D. Install balancing valves in locations where they can easily be adjusted.

E. Install temperature-actuated, water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.

1. Install cabinet-type units recessed in or surface mounted on wall as specified.

F. Install Y-pattern strainers for water on supply side of each water pressure-reducing valve and pump.

G. Install outlet boxes recessed in wall or surface mounted on wall. Install 2-by-4-inch fire-retardant-treated-wood blocking, wall reinforcement between studs. Comply with requirements for fire-retardant-treated-wood blocking in Section 061000 "Rough Carpentry."

H. Install water-hammer arresters in water piping according to PDI-WH 201.

I. Install air vents at high points of water piping.

J. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

K. Install drainage-type, trap-seal primer valves as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.

L. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.

3.2 CONNECTIONS

A. Comply with requirements for ground equipment in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Fire-retardant-treated-wood blocking is specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test each pressure vacuum breaker, reduced-pressure-principle backflow preventer, double-check backflow-prevention assembly according to authorities having jurisdiction and the device's reference standard.

B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.4 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION 221119

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.
2. Waste, Force-Main Piping: 100 psig.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.

C. Shop Drawings: For sovent drainage system. Include plans, elevations, sections, and details.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Sovent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, cast-iron aerator and deaerator drainage fittings.

C. CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. ANACO-Husky.
    b. Dallas Specialty & Mfg. Co.
    c. Fernco Inc.
2. Standards: ASTM C 1277 and CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

D. Cast-Iron, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. MG Piping Products Company.
2. Standard: ASTM C 1277.
3. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.3 DUCTILE-IRON PIPE AND FITTINGS

A. Ductile-Iron, Mechanical-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. Ductile-Iron Fittings: AWWA C110/A21.10, mechanical-joint, ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
3. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Ductile-Iron, Grooved-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51 with round-cut-grooved ends according to AWWA C606.
2. Ductile-Iron-Pipe Appurtenances:

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

        1) Anvil International.
        2) Shurjoint Piping Products.
        3) Star Pipe Products.
        4) Victaulic Company.

    b. Grooved-End, Ductile-Iron Fittings: ASTM A 536 ductile-iron castings with dimensions matching AWWA C110/A 21.10 ductile-iron pipe or AWWA C153/A 21.53 ductile-iron fittings and complying with AWWA C606 for grooved ends.
    c. Grooved Mechanical Couplings for Ductile-Iron Pipe: ASTM F 1476, Type I. Include ferrous housing sections with continuous curved keys; EPDM-rubber center-leg gasket suitable for hot and cold water; and bolts and nuts.

2.4 COPPER TUBE AND FITTINGS

A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.

B. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

C. Hard Copper Tube: ASTM B 88, Type L and Type M, water tube, drawn temper.

D. Soft Copper Tube: ASTM B 88, Type L, water tube, annealed temper.

E. Copper Pressure Fittings:

1. Copper Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

F. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.

1. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

G. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

2.5 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.

C. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

D. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Solvent Cement: ASTM D 2564.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.6 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
3. Unshielded, Nonpressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Dallas Specialty & Mfg. Co.
2) Fernco Inc.
3) Mission Rubber Company; a division of MCP Industries, Inc.
4) Plastic Oddities; a division of Diverse Corporate Technologies, Inc.

b. Standard: ASTM C 1173.
c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
d. Sleeve Materials:

1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

4. Shielded, Non pressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Cascade Waterworks Mfg. Co.
2) Mission Rubber Company; a division of MCP Industries, Inc.

b. Standard: ASTM C 1460.

c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

5. Pressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Cascade Waterworks Mfg. Co.
2) Dresser, Inc.
3) EBAA Iron, Inc.

b. Standard: AWWA C219.
c. Description: Metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.
d. Center-Sleeve Material: Manufacturer's standard.
e. Gasket Material: Natural or synthetic rubber.
f. Metal Component Finish: Corrosion-resistant coating or material.

B. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
2. Dielectric Unions:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Capitol Manufacturing Company.
2) Central Plastics Company.
3) Hart Industries International, Inc.

b. Description:

1) Standard: ASSE 1079.
2) Pressure Rating: 125 psig minimum at 180 deg F.
3) End Connections: Solder-joint copper alloy and threaded ferrous.

3. Dielectric Flanges:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Capitol Manufacturing Company.
2) Central Plastics Company.
3) Matco-Norca, Inc.

b. Description:

1) Standard: ASSE 1079.
2) Factory-fabricated, bolted, companion-flange assembly.
3) Pressure Rating: 125 psig minimum at 180 deg F.

4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

4. Dielectric-Flange Insulating Kits:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Advance Products & Systems, Inc.
2) Calpico, Inc.
3) Central Plastics Company.

b. Description:

1) Nonconducting materials for field assembly of companion flanges.
2) Pressure Rating: 150 psig.
3) Gasket: Neoprene or phenolic.
4) Bolt Sleeves: Phenolic or polyethylene.
5) Washers: Phenolic with steel backing washers.

5. Dielectric Nipples:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Elster Perfection.
2) Grinnell Mechanical Products.
3) Matco-Norca, Inc.
4) Precision Plumbing Products, Inc.
5) Victaulic Company.

b. Description:

1) Standard: IAPMO PS 66
2) Electroplated steel nipple.
3) Pressure Rating: 300 psig at 225 deg F.
4) End Connections: Male threaded or grooved.
5) Lining: Inert and noncorrosive, propylene.

2.7 ENCASEMENT FOR UNDERGROUND METAL PIPING

A. Standard: ASTM A 674 or AWWA C105/A 21.5.

B. Material: Linear low-density polyethylene film of 0.008-inch or high-density, cross-laminated polyethylene film of 0.004-inch minimum thickness.

C. Form: Sheet or tube.

D. Color: Black or natural.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Earth Moving.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Vibration and Seismic Controls for Plumbing Piping and Equipment.

K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

M. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

O. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

P. Install aboveground PVC piping according to ASTM D 2665.

Q. Install underground PVC piping according to ASTM D 2321.

R. Install engineered soil and waste drainage and vent piping systems as follows:

1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
2. Sovent Drainage System: Comply with ASSE 1043 and sovent fitting manufacturer's written installation instructions.
3. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.

S. Install underground, ductile-iron, force-main piping according to AWWA C600. Install buried piping inside building between wall and floor penetrations and connection to sanitary sewer piping outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.

1. Install encasement on piping according to ASTM A 674 or AWWA C105/A 21.5.

T. Install underground, copper, force-main tubing according to CDA's "Copper Tube Handbook."

1. Install encasement on piping according to ASTM A 674 or AWWA C105/A 21.5.

U. Install force mains at elevations indicated.

V. Plumbing Specialties:

1. Install backwater valves in sanitary waster gravity-flow piping. Comply with requirements for backwater valves specified in Sanitary Waste Piping Specialties.
2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping. Comply with requirements for cleanouts specified in Sanitary Waste Piping Specialties.
3. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Sanitary Waste Piping Specialties.

W. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

X. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Sleeves and Sleeve Seals for Plumbing Piping.

Y. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Sleeves and Sleeve Seals for Plumbing Piping.

Z. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Escutcheons for Plumbing Piping.

3.3 JOINT CONSTRUCTION

A. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

B. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

C. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

D. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

E. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
3. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in OD's.
2. In Drainage Piping: Unshielded, nonpressure transition couplings.
3. In Aboveground Force Main Piping: Fitting-type transition couplings.
4. In Underground Force Main Piping:

    a. NPS 1-1/2 and Smaller: Fitting-type transition couplings.
    b. NPS 2 and Larger: Pressure transition couplings.

B. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for NPS 2 and Smaller: Use dielectric nipples or unions.
3. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges.
4. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.
5.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Vibration and Seismic Controls for Plumbing Piping and Equipment.

B. Comply with requirements for pipe hanger and support devices and installation specified in Hangers and Supports for Plumbing Piping and Equipment.

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Install individual, straight, horizontal piping runs:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4: 84 inches with 3/8-inch rod.
2. NPS 1-1/2: 108 inches with 3/8-inch rod.
3. NPS 2: 10 feet with 3/8-inch rod.
4. NPS 2-1/2: 11 feet with 1/2-inch rod.
5. NPS 3: 12 feet with 1/2-inch rod.
6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
7. NPS 6 and NPS 8: 12 feet with 3/4-inch rod.

I. Install supports for vertical steel piping every 15 feet.

J. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4: 72 inches with 3/8-inch rod.
2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
3. NPS 2-1/2: 108 inches with 1/2-inch rod.
4. NPS 3 and NPS 5: 10 feet with 1/2-inch rod.
5. NPS 6: 10 feet with 5/8-inch rod.
6. NPS 8: 10 feet with 3/4-inch rod.

K. Install supports for vertical copper tubing every 10 feet.

L. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
2. NPS 3: 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 48 inches with 3/4-inch rod.

M. Install supports for vertical PVC piping every 48 inches.

N. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Install horizontal backwater valves with cleanout cover flush with floor.
6. Comply with requirements for backwater valves cleanouts and drains specified in Sanitary Waste Piping Specialties.
7. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

D. Connect force-main piping to the following:

1. Sanitary Sewer: To exterior force main.
2. Sewage Pump: To sewage pump discharge.

E. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

F. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.7 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Identification for Plumbing Piping and Equipment.

3.8 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

3.9 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

3.10 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 and smaller shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings and sovent stack fittings; CISPI hubless-piping couplings; and coupled joints.
3. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.

C. Aboveground, soil and waste piping NPS 5 and larger shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings and sovent stack fittings; CISPI heavy-duty hubless-piping couplings; and coupled joints.
3. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.

D. Aboveground, vent piping NPS 4 and smaller shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
3. Copper DWV tube, copper drainage fittings, and soldered joints.

a. Option for Vent Piping, NPS 2-1/2 and NPS 3-1/2: Hard copper tube, Type M; copper pressure fittings; and soldered joints.

4. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.

E. Underground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:

1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI cast-iron hubless-piping couplings; and coupled joints.
3. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.

F. Underground, soil and waste piping NPS 5 and larger shall be any of the following:

1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI cast-iron hubless-piping couplings; coupled joints.
3. Solid-wall PVC pipe; PVC socket fittings; and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.

END OF SECTION 221316

SECTION 22 14 13 - FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water.
2. Storm Drainage, Force-Main Piping: 100 psig.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.
2. Laboratory Test Reports for Credit IEQ 4: For solvent cements and adhesive primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings: For controlled-flow roof drainage system. Include calculations, plans, and details.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. ANACO-Husky.
   b. Dallas Specialty & Mfg. Co.
   c. Fernco Inc.

2. Standards: ASTM C 1277 and CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

C. Cast-Iron, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. MG Piping Products Company.

2. Standard: ASTM C 1277.
3. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.3 DUCTILE-IRON PIPE AND FITTINGS

A. Ductile-Iron, Mechanical-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. Ductile-Iron Fittings: AWWA C110/A21.10, mechanical-joint ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
3. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Ductile-Iron, Push-On-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. Ductile-Iron Fittings: AWWA C110/A21.10, push-on-joint ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
3. Gaskets: AWWA C111/A21.11, rubber.

C. Ductile-Iron, Grooved-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51 with round-cut-grooved ends according to AWWA C606.
2. Ductile-Iron-Pipe Appurtenances:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Anvil International.
2) Shurjoint Piping Products.
3) Star Pipe Products.
4) Victaulic Company.

b. Grooved-End, Ductile-Iron Fittings: ASTM A 536 ductile-iron castings with dimensions matching AWWA C110/A21.10 ductile-iron pipe or AWWA C153/A21.53 ductile-iron fittings and complying with AWWA C606 for grooved ends.
c. Grooved Mechanical Couplings for Ductile-Iron Pipe: ASTM F 1476, Type I. Include ferrous housing sections with continuous curved keys; EPDM-rubber center-leg gasket suitable for hot and cold water; and bolts and nuts.

2.4 COPPER TUBE AND FITTINGS

A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.

B. Copper Drainage Fittings: ASME B16.23, cast-copper fittings or ASME B16.29, wrought-copper, solder-joint fittings.

C. Hard Copper Tube: ASTM B 88, Type L, water tube, drawn temper.

D. Soft Copper Tube: ASTM B 88, Type L, water tube, annealed temper.

E. Copper Pressure Fittings:

1. Copper Fittings: ASME B16.18, cast-copper-alloy fittings or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

F. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.

1. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

G. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

2.5 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.

C. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

D. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Solvent Cement: ASTM D 2564.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.6 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified-piping-system fitting.
3. Unshielded, Nonpressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Dallas Specialty & Mfg. Co.
2) Fernco Inc.
3) Mission Rubber Company; a division of MCP Industries, Inc.
4) Plastic Oddities; a division of Diverse Corporate Technologies, Inc.

b. Standard: ASTM C 1173.
c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
d. Sleeve Materials:

1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

4. Shielded, Nonpressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Cascade Waterworks Mfg. Co.
2) Mission Rubber Company; a division of MCP Industries, Inc.

b. Standard: ASTM C 1460.
c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

5. Pressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Cascade Waterworks Mfg. Co.
2) Dresser, Inc.
3) EBAA Iron, Inc.
4) Ford Meter Box Company, Inc. (The)
5) JCM Industries, Inc.
6) Romac Industries, Inc.
7) Smith-Blair, Inc.; a Sensus company.
8) Viking Johnson; c/o Mueller Co.

b. Standard: AWWA C219.
c. Description: Metal, sleeve-type couplings same size as, with pressure rating at least equal to and ends compatible with, pipes to be joined.

d. Center-Sleeve Material: Manufacturer's standard.
e. Gasket Material: Natural or synthetic rubber.
f. Metal Component Finish: Corrosion-resistant coating or material.

B. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
2. Dielectric Unions:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Capitol Manufacturing Company.
2) Central Plastics Company.
3) Hart Industries International, Inc.
4) Jomar International Ltd.
5) Matco-Norca, Inc.
6) McDonald, A. Y. Mfg. Co.
7) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
8) Wilkins; a Zurn company.

b. Description:

1) Standard: ASSE 1079.
2) Pressure Rating: 150 psig at 180 deg F .
3) End Connections: Solder-joint copper alloy and threaded ferrous.

3. Dielectric Flanges:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Capitol Manufacturing Company.
2) Central Plastics Company.
3) Matco-Norca, Inc.
4) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
5) Wilkins; a Zurn company.

b. Description:

1) Standard: ASSE 1079.
2) Factory-fabricated, bolted, companion-flange assembly.
3) Pressure Rating: 150 psig.
4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

4. Dielectric-Flange Insulating Kits:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Advance Products & Systems, Inc.
2) Calpico, Inc.
3) Central Plastics Company.
4) Pipeline Seal and Insulator, Inc.

b. Description:

1) Nonconducting materials for field assembly of companion flanges.
2) Pressure Rating: 150 psig.
3) Gasket: Neoprene or phenolic.
4) Bolt Sleeves: Phenolic or polyethylene.
5) Washers: Phenolic with steel-backing washers.

5. Dielectric Nipples:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Elster Perfection.
2) Grinnell Mechanical Products.
3) Matco-Norca, Inc.
4) Precision Plumbing Products, Inc.
5) Victaulic Company.

b. Description:

1) Electroplated steel nipple complying with ASTM F 1545.
2) Pressure Rating: 300 psig at 225 deg F.
3) End Connections: Male threaded or grooved.
4) Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Earth Moving.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations from layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Vibration and Seismic Controls for Plumbing Piping and Equipment.

K. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

M. Install storm drainage piping at the following minimum slopes unless otherwise indicated:

1. Building and Horizontal Storm Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.

N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105.

O. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

P. Install aboveground PVC piping according to ASTM D 2665.

Q. Install underground PVC piping according to ASTM D 2321.

R. Install engineered controlled-flow drain specialties and storm drainage piping in locations indicated.

S. Install underground, ductile-iron, force-main piping according to AWWA C600. Install buried piping inside building between wall and floor penetrations and connection to storm sewer piping outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.

1. Install encasement on piping according to ASTM A 674 or AWWA C105.

T. Install underground, copper, force-main tubing according to CDA's "Copper Tube Handbook."

1. Install encasement on piping according to ASTM A 674 or AWWA C105.

U. Install force mains at elevations indicated.

V. Plumbing Specialties:

1. Install backwater valves in storm drainage gravity-flow piping. Comply with requirements for backwater valves specified in Storm Drainage Piping Specialties.
2. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers in storm drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping. Comply with requirements for cleanouts specified in Storm Drainage Piping Specialties.
3. Install drains in storm drainage gravity-flow piping. Comply with requirements for drains specified in Storm Drainage Piping Specialties.

W. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

X. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Sleeves and Sleeve Seals for Plumbing Piping.

Y. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Sleeves and Sleeve Seals for Plumbing Piping.

Z. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Escutcheons for Plumbing Piping.

3.3 JOINT CONSTRUCTION

A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Hub-and-Spigot, Cast-Iron Soil Piping Calked Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.

C. Hubless, Cast-Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Join copper tube and fittings with soldered joints according to ASTM B 828 procedure. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

F. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fittings. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

G. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

H. Plastic, Nonpressure-Piping, Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
3. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in OD's.
2. In Drainage Piping: Unshielded, nonpressure transition couplings.
3. In Aboveground Force-Main Piping: Fitting-type transition couplings.
4. In Underground Force-Main Piping:

    a. NPS 1-1/2 and Smaller: Fitting-type transition couplings.
    b. NPS 2 and Larger: Pressure transition couplings.

B. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for NPS 2 and Smaller: Use dielectric nipples.
3. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges.
4. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Vibration and Seismic Controls for Plumbing Piping and Equipment.

B. Comply with requirements for pipe hanger and support devices and installation specified in Hangers and Supports for Plumbing Piping and Equipment.

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Individual, Straight, Horizontal Piping Runs:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support horizontal piping and tubing within 12 inches of each fitting**,** valve, and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4: 84 inches with 3/8-inch rod.
2. NPS 1-1/2: 108 inches with 3/8-inch rod.
3. NPS 2: 10 feet with 3/8-inch rod.
4. NPS 2-1/2: 11 feet with 1/2-inch rod.
5. NPS 3: 12 feet with 1/2-inch rod.
6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
7. NPS 6 and NPS 8: 12 feet with 3/4-inch rod.

I. Install supports for vertical steel piping every 15 feet.

J. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4: 72 inches with 3/8-inch rod.
2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
3. NPS 2-1/2: 108 inches with 1/2-inch rod.
4. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
5. NPS 6: 10 feet with 5/8-inch rod.

6. NPS 8: 10 feet with 3/4-inch rod.

K. Install supports for vertical copper tubing every 10 feet.

L. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
2. NPS 3: 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 48 inches with 3/4-inch rod.

M. Install supports for vertical PVC piping every 48 inches.

N. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

C. Connect storm drainage piping to roof drains and storm drainage specialties.

1. Install test tees (wall cleanouts) in conductors near floor, and floor cleanouts with cover flush with floor.
2. Install horizontal backwater valves with cleanout cover flush with floor or in pit with pit cover flush with floor.
3. Comply with requirements for backwater valves cleanouts and drains specified in Storm Drainage Piping Specialties.

D. Connect force-main piping to the following:

1. Storm Sewer: To exterior force main.
2. Sump Pumps: To sump pump discharge.

E. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

F. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.7 IDENTIFICATION

A. Identify exposed storm drainage piping. Comply with requirements for identification specified in Identification for Plumbing Piping and Equipment.

3.8 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Test Procedure: Test storm drainage piping on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts until completion of inspection, water level must not drop. Inspect joints for leaks.
4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

3.9 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.10 PIPING SCHEDULE

A. Retain piping applications from this article. Coordinate with materials specified in Part 2. Revise to suit Project.

1. Plastic DWV Pipe and Fittings:
   - Piping: PVC Schedule 40, ASTM D 1785
   - Fittings / Joints: PVC, DWV, ASTM D 2665. Provide solvent compatible with piping materials
   - Applications: Air-conditioning condensate
   - Restrictions on Use: Not permitted in HVAC ceiling plenums or shafts used to convey building air distribution where not rated for that application

2. Cast-Iron Hub and Spigot Pipe and Fittings:
   - Piping: ASTM A 74 service class cast-iron
   - Fittings / Joints: Neoprene gasket
   - Applications: Storm piping; including exterior and below slab on earth

3. Cast-Iron No-Hub Pipe and Fittings:
   - Piping: Soil Pipe Institute Standard 301 cast-iron
   - Fittings / Joints: Neoprene gaskets, ASTM C 564, and 24-gage type 304 stainless-steel housing with two stainless-steel bolted clamps. Where couplings will be inaccessible, or pipe is exposed, fittings assembled with either:
     1. Neoprene gaskets and two-piece cast-iron housing clamps and type 304 stainless-steel bolts and nuts
     2. Corrugated type 304 stainless-steel shields with four or six clamps and holding bolts
   - Applications: Storm piping; including concealed within walls or partitions, ceiling space, interior exposed, and within crawl space, Air-Conditioning condensate.
   - Restrictions on Use: Not permitted in piping above food preparation, food storage, serving, or dining areas.

4. Copper Tubing and Fittings:
   - Piping: Type DWV copper, ASTM B 306
   - Fittings / Joints: Wrought copper drainage fittings, ANSI B16.29, or cast-brass fittings, ANSI B16.23
   - Applications: Storm piping; including concealed within walls or partitions and ceiling space, Air-conditioning condensate

END OF SECTION 221413

SECTION 22 14 23 - STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Roof drains.
2. Miscellaneous storm drainage piping specialties.
3. Through-penetration firestop assemblies.
4. Flashing materials.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 METAL ROOF DRAINS

A. Cast-Iron, Medium-Sump, General-Purpose Roof Drains:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Josam Company.
    b. Wade.
    c. Watts.
    d. Zurn.
    e. MIFAB, Inc.
2. Standard: ASME A112.6.4, for general-purpose roof drains.

3. Body Material: Cast iron – Clamping collar, the strainer shall be attached to the clamping ring with 16-gauge stainless steel wire ties.
4. Dimension of Body:15-inch diameter.
5. Dome Material: Aluminum.
6. Water Dam: 2 inches high.
7. Under deck clamp: 2x4 wood, extension preferred.
8. Vandal Proof Dome: Required.

2.2 MISCELLANEOUS STORM DRAINAGE PIPING SPECIALTIES

A. Conductor Nozzles:

1. Description: Bronze body with threaded inlet and bronze wall flange with mounting holes.
2. Size: Same as connected conductor.

2.3 THROUGH-PENETRATION FIRESTOP ASSEMBLIES

A. Through-Penetration Firestop Assemblies:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. ProSet Systems Inc.

2. Standard: ASTM E 814, for through-penetration firestop assemblies.
3. Certification and Listing: Intertek Testing Service NA for through-penetration firestop assemblies.
4. Size: Same as connected pipe.
5. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
6. Stack Fitting: ASTM A 48/A 48M, gray-iron, hubless-pattern, wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.
7. Special Coating: Corrosion resistant on interior of fittings.

2.4 FLASHING MATERIALS

A. Copper Sheet: ASTM B 152/B 152M,12 oz./sq. ft..

B. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch minimum thickness unless otherwise indicated. Include G90 hot-dip galvanized, mill-phosphatized finish for painting if indicated.

C. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.

D. Fasteners: Metal compatible with material and substrate being fastened.

E. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

F. Solder: ASTM B 32, lead-free alloy.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.

1. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
2. Install expansion joints, if indicated, in roof drain outlets.
3. Position roof drains for easy access and maintenance.

B. Install downspout adapters on outlet of back-outlet parapet roof drains and connect to sheet metal downspouts.

C. Install conductor nozzles at exposed bottom of conductors where they spill onto grade.

D. Install cleanouts in aboveground piping and building drain piping according to the following instructions unless otherwise indicated:

1. Use cleanouts the same size as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
3. Locate cleanouts at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate cleanouts at base of each vertical soil and waste stack.

E. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

F. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

G. Install horizontal backwater valves in floor with cover flush with floor.

H. Install drain-outlet backwater valves in outlet of drains.

I. Install test tees in vertical conductors and near floor.

J. Install wall cleanouts in vertical conductors. Install access door in wall if indicated.

K. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface unless otherwise indicated.

L. Assemble channel drainage system components according to manufacturer's written instructions. Install on support devices so that top will be flush with adjacent surface.

M. Install through-penetration firestop assemblies in plastic conductors at concrete floor penetrations.

N. Install sleeve flashing device with each conductor passing through floors with waterproof membrane.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Facility Storm Drainage Piping. Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece of metal unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Lead Sheets: Burn joints of 6.0-lb/sq. ft. lead sheets, 0.0938-inch thickness or thicker. Solder joints of 4.0-lb/sq. ft. lead sheets, 0.0625-inch thickness or thinner.
2. Copper Sheets: Solder joints of copper sheets.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching the pipe size, with a minimum length of 10 inches and with skirt or flange extending at least 8 inches around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221423

SECTION 230513 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with NEMA MG 1 unless otherwise indicated.

B. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Energy efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.

1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Multispeed Motors: Separate winding for each speed.

F. Rotor: Random-wound, squirrel cage.

G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

H. Temperature Rise: Match insulation rating.

I. Insulation: Class F.

J. Code Letter Designation:

1. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.

K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.

B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer**.**

1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Pre lubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENT

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

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Pipe labels.
3. Duct labels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032-inch stainless steel, 0.025-inch aluminum, 0.032-inch or anodized aluminum, 0.032-inch] minimum thickness and having predrilled or stamped holes for attachment hardware.
2. Letter Color: White
3. Background Color: Black .
4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
5. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
6. Fasteners: Stainless-steel rivets or self-tapping screws.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick and having predrilled holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction according to ASME A13.1.

B. Pretension Pipe Labels: Precoiled, semi rigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.

2. Lettering Size: Size letters according to ASME A13.1 for piping

2.3 DUCT LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: White.

C. Background Color: Black .

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings; also include duct size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions or as separate unit on each duct label to indicate flow direction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

A. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, with painted, color-coded bands or rectangles] on each piping system.

1. Identification Paint: Use for contrasting background.

2. Stencil Paint: Use for pipe marking.

B. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.

2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.

3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.

4. At access doors, manholes, and similar access points that permit view of concealed piping.

5. Near major equipment items and other points of origination and termination.

6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to25 feet in areas of congested piping and equipment.

7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

C. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

D. Pipe Label Color Schedule:

1. Refrigerant Piping: Black letters on a safety-orange background or White letters on a safety-purple background or Black letters on a safety-white background or White letters on a safety-gray background or White letters on a safety-black background

3.5 DUCT LABEL INSTALLATION

A. Install plastic-laminated or self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:

1. Blue For cold-air supply ducts.
2. Green For exhaust.

B. Stenciled Duct Label Option: Stenciled labels showing service and flow direction may be provided instead of plastic-laminated duct labels, at Installer's option.

C. Locate labels near points where ducts enter into and exit from concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.6 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sound tests.
2. Vibration tests.
3. Control system verification.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. BAS: Building automation systems.

C. NEBB: National Environmental Balancing Bureau.

D. TAB: Testing, adjusting, and balancing.

E. TABB: Testing, Adjusting, and Balancing Bureau.

F. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

G. TDH: Total dynamic head.

1.4 PREINSTALLATION MEETINGS

A. TAB Conference: If requested by the Owner, conduct a TAB conference at Project site after approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Provide a minimum of 14 days' advance notice of scheduled meeting time and location.

1. Minimum Agenda Items:

a. The Contract Documents examination report.
b. The TAB plan.
c. Needs for coordination and cooperation of trades and subcontractors.
d. Proposed procedures for documentation and communication flow.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: Within **30** days of Contractor's Notice to Proceed, submit documentation that the TAB specialist and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Contract Documents Examination Report: Within 30days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.

C. Strategies and Procedures Plan: Within30days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

D. System Readiness Checklists: Within **30**days of Contractor's Notice to Proceed, submit system readiness checklists as specified in "Preparation" Article.

E. Examination Report: Submit a summary report of the examination review required in "Examination" Article.

F. Certified TAB reports.

G. Sample report forms.

H. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.6 QUALITY ASSURANCE

A. TAB Specialists Qualifications: Certified by AABC NEBB or TABB.

1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC NEBB or TABB.
2. TAB Technician: Employee of the TAB specialist and certified by AABC NEBB or TABB as a TAB technician.

B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, “Instrumentation."

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.7 FIELD CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

J. Examine operating safety interlocks and controls on HVAC equipment.

K. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes the following:

1. Equipment and systems to be tested.
2. Strategies and step-by-step procedures for balancing the systems.
3. Instrumentation to be used.
4. Sample forms with specific identification for all equipment.

B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Airside:

a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
b. Duct systems are complete with terminals installed.
c. Volume, smoke, and fire dampers are open and functional.
d. Clean filters are installed.
e. Fans are operating, free of vibration, and rotating in correct direction.
f. Variable-frequency controllers' startup is complete and safeties are verified.
g. Automatic temperature-control systems are operational.
h. Ceilings are installed.
i. Windows and doors are installed.
j. Suitable access to balancing devices and equipment is provided.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", ASHRAE 111, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" or SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.

C. Mark equipment and balancing devices, including damper-control positions, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP**)** units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

D. Verify that motor starters are equipped with properly sized thermal protection.

E. Check dampers for proper position to achieve desired airflow path.

F. Check for airflow blockages.

3.5 PROCEDURES FOR MOTORS

A. Motors 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Phase and hertz.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter size and thermal-protection-element rating.
8. Service factor and frame size.

B. Motors Driven by Variable-Frequency Controllers: Test manual bypass of controller to prove proper operation.

3.6 SOUND TESTS

A. After the systems are balanced and construction is Substantially Complete, measure and record sound levels at 5locations as designated by the Architect.

B. Instrumentation:

1. The sound-testing meter shall be a portable, general-purpose testing meter consisting of a microphone, processing unit, and readout.
2. The sound-testing meter shall be capable of showing fluctuations at minimum and maximum levels, and measuring the equivalent continuous sound pressure level (LEQ).

3. The sound-testing meter must be capable of using 1/3 octave band filters to measure mid-frequencies from 31.5 Hz to 8000 Hz.
4. The accuracy of the sound-testing meter shall be plus or minus one decibel.

C. Test Procedures:

1. Perform test at quietest background noise period. Note cause of unpreventable sound that affects test outcome.
2. Equipment should be operating at design values.
3. Calibrate the sound-testing meter prior to taking measurements.
4. Use a microphone suitable for the type of noise levels measured that is compatible with meter. Provide a windshield for outside or in-duct measurements.
5. Record a set of background measurements in dBA and sound pressure levels in the eight un-weighted octave bands63 Hz to 8000 Hz (NC31.5 Hz to 4000 Hz (RC) with the equipment off.
6. Take sound readings in dBA and sound pressure levels in the eight un-weighted octave bands 63 Hz to 8000 Hz (NC) 31.5 Hz to 4000 Hz (RC) with the equipment operating.
7. Take readings no closer than 36 inches from a wall or from the operating equipment and approximately 60 inches from the floor, with the meter held or mounted on a tripod.
8. For outdoor measurements, move sound-testing meter slowly and scan area that has the most exposure to noise source being tested. Use A-weighted scale for this type of reading.

D. Reporting:

1. Report shall record the following:

a. Location.
b. System tested.
c. dBA reading.
d. Sound pressure level in each octave band with equipment on and off.

2. Plot sound pressure levels on **NC** worksheet with equipment on and off.

3.7 VIBRATION TESTS

A. Instrumentation:

1. Use portable, battery-operated, and microprocessor-controlled vibration meter with or without a built-in printer.
2. The meter shall automatically identify engineering units, filter bandwidth, amplitude, and frequency scale values.
3. The meter shall be able to measure machine vibration displacement in mils of deflection, velocity in inches per second, and acceleration in inches per second squared.
4. Verify calibration date is current for vibration meter before taking readings.

B. Test Procedures:

1. To ensure accurate readings, verify that accelerometer has a clean, flat surface and is mounted properly.
2. With the unit running, set up vibration meter in a safe, secure location. Connect transducer to meter with proper cables. Hold magnetic tip of transducer on top of the bearing, and measure unit in mils of deflection. Record measurement, then move transducer to the side of the bearing and record in mils of deflection. Record an axial reading in mils of deflection by holding nonmagnetic, pointed transducer tip on end of shaft.
3. Change vibration meter to velocity (inches per second) measurements. Repeat and record above measurements.
4. Record CPM or rpm.
5. Read each bearing on motor, fan, and pump as required. Track and record vibration levels from rotating component through casing to base.

C. Reporting:

1. Report shall record location and the system tested.
2. Include horizontal-vertical-axial measurements for tests.
3. Verify that vibration limits follow Specifications, or, if not specified, follow the General Machinery Vibration Severity Chart or Vibration Acceleration General Severity Chart from the AABC National Standards. Acceptable levels of vibration are normally "smooth" to "good."
4. Include in report General Machinery Vibration Severity Chart, with conditions plotted.

3.8 CONTROLS VERIFICATION

A. In conjunction with system balancing, perform the following:

1. Verify temperature control system is operating within the design limitations.
2. Confirm that the sequences of operation are in compliance with Contract Documents.
3. Verify that controllers are calibrated and function as intended.
4. Verify that controller set points are as indicated.
5. Verify the operation of lockout or interlock systems.
6. Verify the operation of valve and damper actuators.
7. Verify that controlled devices are properly installed and connected to correct controller.
8. Verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.
9. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.

B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

3.9 PROGRESS REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems balancing devices. Recommend changes and additions to systems balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to

HVAC systems and general construction to allow access for performance measuring and balancing devices.

B. Status Reports: Prepare weekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.10 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Fan curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans performance forms including the following:

a. Settings for exhaust-air dampers.
b. Fan drive settings including settings and percentage of maximum pitch diameter.
c. Other system operating conditions that affect performance.

D. Fan Test Reports: For exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches, and bore.
h. Center-to-center dimensions of sheave and amount of adjustments in inches.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

E. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.11 VERIFICATION OF TAB REPORT

A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of commissioning authority.

B. Commissioning authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.

C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."

D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

E. If TAB work fails, proceed as follows:

1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.

F. Prepare test and inspection reports.

3.12 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION

SECTION 230719 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes insulating the following HVAC piping systems:

1. Condensate drain piping outdoors.
2. Chilled-water piping outdoors.
3. Refrigerant suction and liquid piping, and outdoors.

B. Related Sections:

1. Section 230716 "HVAC Equipment Insulation."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use.

1. Preformed Pipe Insulation Materials: 12 inches long by NPS 2.
2. Sheet Form Insulation Materials: 12 inches square.

3. Jacket Materials for Pipe: 12 inches long by NPS 2 .
4. Sheet Jacket Materials: 12 inches square.
5. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
1. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Mockups: Before installing insulation, build mockups for each type of insulation and finish listed below to demonstrate quality of insulation application and finishes. Build mockups in the location indicated or, if not indicated, as directed by Architect. Use materials indicated for the completed Work.

1. Piping Mockups:

a. One 10-foot section of NPS 2 straight pipe.
b. One each of a 90-degree threaded, welded, and flanged elbow.
c. One each of a threaded, welded, and flanged tee fitting.
d. One NPS 2 or smaller valve, and one NPS 2-1/2 or larger valve.
e. Four support hangers including hanger shield and insert.
f. One threaded strainer and one flanged strainer with removable portion of insulation.
g. One threaded reducer and one welded reducer.
h. One pressure temperature tap.

i. One mechanical coupling.

2. For each mockup, fabricate cutaway sections to allow observation of application details for insulation materials, adhesives, mastics, attachments, and jackets.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Obtain Architect's approval of mockups before starting insulation application.
5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

B. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Outdoor, Aboveground Piping Insulation Schedule," articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Pittsburgh Corning Corporation; Foamglas.
2. Block Insulation: ASTM C 552, Type I.
3. Special-Shaped Insulation: ASTM C 552, Type III.
4. Board Insulation: ASTM C 552, Type IV.
5. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
6. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.
7. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

G. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied ASJ complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. CertainTeed Corp.; CrimpWrap.
   b. Johns Manville; MicroFlex.
   c. Knauf Insulation; Pipe and Tank Insulation.
   d. Manson Insulation Inc.; AK Flex.
   e. Owens Corning; Fiberglas Pipe and Tank Insulation.

H. Phenolic:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Kingspan Tarec Industrial Insulation NV; Koolphen K.

b. Resolco International BV; Insul-phen.

2. Preformed pipe insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type III, Grade 1.
3. Block insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type II, Grade 1.
4. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
5. Factory-Applied Jacket: Requirements are specified in "Factory-Applied Jackets" Article.

a. Preformed Pipe Insulation: None.

I. Polyisocyanurate: Unfaced, preformed, rigid cellular polyisocyanurate material intended for use as thermal insulation.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Chemical Company (The); Trymer 2000 XP.
b. Duna USA Inc.; Corafoam.
c. Dyplast Products; ISO-25.
d. Elliott Company of Indianapolis; Elfoam.

2. Comply with ASTM C 591, Type I or Type IV, except thermal conductivity (k-value) shall not exceed 0.19 Btu x in./h x sq. ft. x deg F at 75 deg F after 180 days of aging.
3. Flame-spread index shall be 25 or less, and smoke-developed index shall be 50 or less for thickness up to 1 inch as tested by ASTM E 84.

J. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials and Type II, Grade 1 for sheet materials.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Armacell LLC; Tubolit.
b. Nomaco Insulation; IMCOLOCK, IMCOSHEET, NOMALOCK, and NOMAPLY.

K. Polystyrene: Rigid, extruded cellular polystyrene intended for use as thermal insulation. Comply with ASTM C 578, Type IV or Type XIII, except thermal conductivity (k-value) shall not exceed 0.26 Btu x in./h x sq. ft. x deg F after 180 days of aging. Fabricate shapes according to ASTM C 450 and ASTM C 585.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Chemical Company (The); Styrofoam.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Ramco Insulation, Inc.; Super-Stik.

B. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Ramco Insulation, Inc.; Ramcote 1200 and Quik-Cote.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F .

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-84.

2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Phenolic and Polyisocyanurate Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F .

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-96.
b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-33.

2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Aeroflex USA, Inc.; Aeroseal.
    b. Armacell LLC; Armaflex 520 Adhesive.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
    d. K-Flex USA; R-373 Contact Adhesive.
2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
    b. Eagle Bridges - Marathon Industries; 225.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
    d. Mon-Eco Industries, Inc.; 22-25.
2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. Polystyrene Adhesive: Solvent- or water-based, synthetic resin adhesive with a service temperature range of minus 20 to plus 140 deg F .

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-96.
    b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60.

G. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.

b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.
d. Mon-Eco Industries, Inc.; 22-25.

2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

H. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation; 739, Dow Silicone.
b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
c. P.I.C. Plastics, Inc.; Welding Adhesive.
d. Speedline Corporation; Polyco VP Adhesive.

2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

B. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.
b. Eagle Bridges - Marathon Industries; 570.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F .
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for outdoor use on above-ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
b. Eagle Bridges - Marathon Industries; 550.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
d. Mon-Eco Industries, Inc.; 55-50.
e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F .
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.
b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
c. Vimasco Corporation; 713 and 714.
2. Service Temperature Range: 0 to plus 180 deg F.
3. Color: White.

2.6 SEALANTS

A. Joint Sealants:

1. Joint Sealan2ts for Cellular-Glass, Phenolic, and Polyisocyanurate Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
b. Eagle Bridges - Marathon Industries; 405.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45.
d. Mon-Eco Industries, Inc.; 44-05.
e. Pittsburgh Corning Corporation; Pittseal 444.

2. Joint Sealants for Polystyrene Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-70.
    b. Eagle Bridges - Marathon Industries; 405.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45.
    d. Mon-Eco Industries, Inc.; 44-05.

3. Materials shall be compatible with insulation materials, jackets, and substrates.
4. Permanently flexible, elastomeric sealant.
5. Service Temperature Range: Minus 100 to plus 300 deg F .
6. Color: White or gray.
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
    b. Eagle Bridges - Marathon Industries; 405.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
    d. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F .
5. Color: Aluminum.
6. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.

3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F .
5. Color: White.
6. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.7 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Glass-Fiber Fabric: Approximately 2 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in. for covering pipe and pipe fittings.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Chil-Glas Number 10.

B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in. , in a Leno weave, for pipe.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Mast-A-Fab.
b. Vimasco Corporation; Elastafab 894.

2.8 FIELD-APPLIED CLOTHS

A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Alpha Associates, Inc.; Alpha-Maritex 84215 and 84217/9485RW, Luben 59.

2.9 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Johns Manville; Zeston.
    b. P.I.C. Plastics, Inc.; FG Series.
    c. Proto Corporation; LoSmoke.
    d. Speedline Corporation; SmokeSafe.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

    a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

D. Metal Jacket:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Metal Jacketing Systems.
    b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
    c. RPR Products, Inc.; Insul-Mate.

2. Aluminum Jacket: Comply with ASTM B 209 , Alloy 3003, 3005, 3105, or 5005, Temper H-14.

    a. Sheet and roll stock ready for shop or field sizing.
    b. Finish and thickness are indicated in field-applied jacket schedules.
    c. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
    d. Factory-Fabricated Fitting Covers:

        1) Same material, finish, and thickness as jacket.
        2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
        3) Tee covers.
        4) Flange and union covers.
        5) End caps.
        6) Beveled collars.
        7) Valve covers.

8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

3. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.

a. Sheet and roll stock ready for shop or field sizing.
b. Material, finish, and thickness are indicated in field-applied jacket schedules.
c. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
d. Factory-Fabricated Fitting Covers:

1) Same material, finish, and thickness as jacket.
2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
3) Tee covers.
4) Flange and union covers.
5) End caps.
6) Beveled collars.
7) Valve covers.
8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

E. Self-Adhesive Outdoor Jacket: 60-mil- thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a crosslaminated polyethylene film covered with white aluminum-foil facing.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Polyguard Products, Inc.; Alumaguard 60.

2.10 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ABI, Ideal Tape Division; 428 AWF ASJ.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
c. Compac Corporation; 104 and 105.
d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches .
3. Thickness: 11.5 mils .

4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. ABI, Ideal Tape Division; 491 AWF FSK.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
   c. Compac Corporation; 110 and 111.
   d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches .
3. Thickness: 6.5 mils .
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for outdoor applications.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. ABI, Ideal Tape Division; 370 White PVC tape.
   b. Compac Corporation; 130.
   c. Venture Tape; 1506 CW NS.

2. Width: 2 inches .
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. ABI, Ideal Tape Division; 488 AWF.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
   c. Compac Corporation; 120.
   d. Venture Tape; 3520 CW.

2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.11 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. ITW Insulation Systems; Gerrard Strapping and Seals.
   b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.

2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015 inch thick, 1/2 inch wide with wing seal.
3. Aluminum: ASTM B 209 , Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal.
4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

C. Wire: 0.080-inch nickel-copper alloy.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. C & F SWire.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F . Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.

4. Manholes.
5. Handholes.
6. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.

2. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.6 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch , and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

3.7 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.

2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

3.9 INSTALLATION OF PHENOLIC INSULATION

A. General Installation Requirements:

1. Secure single-layer insulation with stainless-steel bands at 12-inch intervals and tighten bands without deforming insulation materials.
2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches . Secure inner layer with 0.062-inch wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.

B. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets with vapor retarders on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

C. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.

D. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.

3.10 INSTALLATION OF POLYISOCYANURATE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with tape or bands and tighten without deforming insulation materials. Orient longitudinal joints between half sections in 3- and 9-o'clock positions on the pipe.
2. For insulation with factory-applied jackets with vapor barriers, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive or tape as recommended by insulation material manufacturer and seal with vapor-barrier mastic.
3. All insulation shall be tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, same thickness of adjacent pipe insulation, not to exceed 1-1/2-inch thickness.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyisocyanurate block insulation of same thickness as pipe insulation.

C. Insulation Installation on Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.

3.11 INSTALLATION OF POLYOLEFIN INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyolefin sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of polyolefin pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.12 INSTALLATION OF POLYSTYRENE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation with tape or bands and tighten bands without deforming insulation materials. Orient longitudinal joints between half sections in 3- and 9-o'clock positions on the pipe.
2. For insulation with factory-applied jackets with vapor barriers, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive or tape as recommended by insulation material manufacturer and seal with vapor-barrier mastic.
3. All insulation shall be tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, and make thickness same as adjacent pipe insulation, not to exceed 1-1/2-inch .
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polystyrene block insulation of same thickness as pipe insulation.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.

3.13 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

E. Where PVDC jackets are indicated, install as follows:

1. Apply three separate wraps of filament tape per insulation section to secure pipe insulation to pipe prior to installation of PVDC jacket.
2. Wrap factory-presized jackets around individual pipe insulation sections with one end overlapping the previously installed sheet. Install presized jacket with an approximate overlap at butt joint of 2 inches over the previous section. Adhere lap seal using adhesive or SSL, and then apply 1-1/4 circumferences of appropriate PVDC tape around overlapped butt joint.
3. Continuous jacket can be spiral-wrapped around a length of pipe insulation. Apply adhesive or PVDC tape at overlapped spiral edge. When electing to use adhesives, refer to manufacturer's written instructions for application of adhesives along this spiral edge to maintain a permanent bond.
4. Jacket can be wrapped in cigarette fashion along length of roll for insulation systems with an outer circumference of 33-1/2 inches or less. The 33-1/2-inch- circumference limit allows for 2-inch- overlap seal. Using the length of roll allows for longer sections of jacket to be installed at one time. Use adhesive on the lap seal. Visually inspect lap seal for "fishmouthing," and use PVDC tape along lap seal to secure joint.
5. Repair holes or tears in PVDC jacket by placing PVDC tape over the hole or tear and wrapping a minimum of 1-1/4 circumferences to avoid damage to tape edges.

3.14 FINISHES

A. Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.15 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.16 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.17 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Chilled Water:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Cellular Glass: 3 inches thick.
b. Flexible Elastomeric: 3 inches thick.

c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 3 inches thick.
d. Phenolic: 2 inches thick.
e. Polyisocyanurate: 2 inches thick.
f. Polyolefin: 3 inches thick.
g. Polystyrene: 2 inches thick.

B. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Cellular Glass: 2 inches (50 mm) thick.
b. Flexible Elastomeric: 2 inches (50 mm) thick.
c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches (50 mm) thick.
d. Phenolic: 2 inches (50 mm) thick.
e. Polyisocyanurate: 2 inches (50 mm) thick.
f. Polyolefin: 2 inches (50 mm) thick.
g. Polystyrene: 2 inches (50 mm) thick.

C. Refrigerant Suction and Hot-Gas Flexible Tubing:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Flexible Elastomeric: 2 inches (50 mm) thick.
b. Polyolefin: 2 inches (50 mm) thick.

3.18 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Exposed:

1. PVC: 20 mils thick.
2. Painted Aluminum, Smooth: 0.016 inch thick.
3. Stainless Steel, Type 304, Smooth 2B Finish: 0.010 inch thick.

END OF SECTION

SECTION 232300 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

1.2 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-410:

1. Suction Lines for Air-Conditioning Applications: 185 psig.
2. Suction Lines for Heat-Pump Applications: 325 psig.
3. Hot-Gas and Liquid Lines: 325 psig.

1.3 QUALITY ASSURANCE

A. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

B. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.4 PRODUCT STORAGE AND HANDLING

A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

PART 2 - EXECUTION

2.1 PIPING APPLICATIONS

A. Suction Lines NPS 1-1/2 and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.

B. Suction Lines NPS 4 and Smaller for Conventional Air-Conditioning Applications: Copper, Type L, drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

C. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.

D. Safety-Relief-Valve Discharge Piping: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with soldered joints.

E. Safety-Relief-Valve Discharge Piping:

1. NPS 1-1/2 and Smaller: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.
2. NPS 2 to NPS 3: Copper, Type K, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

2.2 PIPING INSTALLATION

A. Install refrigerant piping according to ASHRAE 15.

B. Install piping free of sags and bends.

C. Install fittings for changes in direction and branch connections.

D. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

E. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Division 08 if valves or equipment requiring maintenance is concealed behind finished surfaces.

F. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

G. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Install traps and double risers to entrain oil in vertical runs.
4. Liquid lines may be installed level.

H. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

I. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

J. Identify refrigerant piping and valves according to "Identification for HVAC Piping and Equipment.

2.3 PIPE JOINT CONSTRUCTION

A. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."

B. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

2.4 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping and specialties. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.
    1. Fill system with nitrogen to the required test pressure.
    2. System shall maintain test pressure at the manifold gage throughout duration of test.
    3. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
    4. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

2.5 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
4. Charge system with a new filter-dryer core in charging line.

2.6 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Adjust set-point temperature of air-conditioning or controllers to the system design temperature.

D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Verify that compressor oil level is correct.
2. Open compressor suction and discharge valves.
3. Open refrigerant valves except bypass valves that are used for other purposes.
4. Check open compressor-motor alignment and verify lubrication for motors and bearings.

E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION

SECTION 233423 - HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Centrifugal roof ventilators.

1.3 PERFORMANCE REQUIREMENTS

A. Project Altitude: Base fan-performance ratings on sea level.

B. Operating Limits: Classify according to AMCA 99.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Also include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material thickness and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.
6. Roof curbs.
7. Fan speed controllers.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Delegated-Design Submittal: For unit hangars and supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Roof framing and support members relative to duct penetrations.
2. Size and location of initial access modules for acoustical tile.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: One set(s) for each belt-driven unit.

1.8 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.

C. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

1.9 COORDINATION

A. Coordinate size and location of structural-steel support members.

B. Coordinate sizes and locations of concrete bases with actual equipment provided.

C. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.1 CENTRIFUGAL ROOF VENTILATORS

A. Housing: Removable, spun-aluminum, dome top and outlet baffle square, one-piece, aluminum base with venturi inlet cone.

1. Downblast Units: Provide spun-aluminum discharge baffle to direct discharge air downward.
2. Hinged Sub base: Galvanized-steel hinged arrangement permitting service and maintenance.

B. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.

C. Belt Drives:

1. Resiliently mounted to housing.
2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
4. Pulleys: Cast-iron, adjustable-pitch motor pulley.
5. Fan and motor isolated from exhaust airstream.

D. Accessories:

1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Disconnect Switch: Non-fusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
3. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
5. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.

E. Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inchthick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.

1. Configuration: Self-flashing without a cant strip, with mounting flange]
2. Overall Height: 18 inches
3. Sound Curb: Curb with sound-absorbing insulation.
4. Pitch Mounting: Manufacture curb for roof slope.
5. Metal Liner: Galvanized steel.
6. Mounting Pedestal: Galvanized steel with removable access panel.
7. Vented Curb: Unlined with louvered vents in vertical sides.

F. Capacities and Characteristics: Shall match existing

2.2 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

B. Enclosure Type: Totally enclosed, fan cooled.

2.3 SOURCE QUALITY CONTROL

A. Certify sound-power level ratings according to AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Certify fan performance ratings, including flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install power ventilators level and plumb.

B. Equipment Mounting:

1. Install power ventilators on cast-in-place concrete equipment base(s).

C. Secure roof-mounted fans to roof curbs with cadmium-plated hardware. See Section 077200 "Roof Accessories" for installation of roof curbs.

D. Label units according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Install ducts adjacent to power ventilators to allow service and maintenance.

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
5. Adjust belt tension.
6. Adjust damper linkages for proper damper operation.
7. Verify lubrication for bearings and other moving parts.
8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
10. Shut unit down and reconnect automatic temperature-control operators.
11. Remove and replace malfunctioning units and retest as specified above.

C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

C. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.

D. Replace fan and motor pulleys as required to achieve design airflow.

E. Lubricate bearings.

END OF SECTION

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes grounding and bonding systems and equipment, plus the following special applications:

1. Ground bonding common with lightning protection system.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans showing dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:

1. Ground rods.

B. Qualification Data: For testing agency and testing agency's field supervisor.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in other section for "Operation and Maintenance Data," include the following:

a. Plans showing as-built, dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:

b. ield Quality Control" Article, including the following:

1. Ground rods.

c. Instructions for periodic testing and inspection of grounding features at grounding connections for separately derived systems based on NETA MTS.

1. Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
2. Include recommended testing intervals.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advanced Lightning Technology, Ltd.
2. Burndy; Part of Hubbell Electrical Systems.
3. ERICO International Corporation.
4. Galvan Industries, Inc.; Electrical Products Division, LLC.
5. O-Z/Gedney; a brand of Emerson Industrial Automation.
6. Thomas & Betts Corporation; A Member of the ABB Group.

2.3 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

D. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

E. Conduit Hubs: Mechanical type, terminal with threaded hub.

F. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

G. Straps: Solid copper, copper lugs. Rated for 600 A.

H. Tower Ground Clamps: Mechanical type, copper or copper alloy, terminal two-piece clamp.

I. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

J. Water Pipe Clamps:

1. Mechanical type, two pieces with stainless-steel bolts.

   a. Material: Die-cast zinc alloy.
   b. Listed for direct burial.

2. U-bolt type with malleable-iron clamp and copper ground connector rated for direct burial.

2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3 m).

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Receptacle circuits.
3. Single-phase motor and appliance branch circuits.
4. Three-phase motor and appliance branch circuits.
5. Flexible raceway runs.
6. Armored and metal-clad cable runs.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. g electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

D. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. Use exothermic welds for all below-grade connections.

E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

F. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around the perimeter of building.

1. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps to building steel.
2. Bury ground ring not less than 24 inches (600 mm) from building's foundation.

G. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at individual ground rods. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

D. Grounding system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

F. Report measured ground resistances that exceed the code required values.

G. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Boxes, enclosures, and cabinets.

1.3 DEFINITIONS

A. GRC: Galvanized rigid steel conduit.

B. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, and fittings.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. Seismic Qualification Data: Certificates, for enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.

C. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Metal Conduit:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allied Tube & Conduit; a part of Atkore International.
    b. FSR Inc.
    c. NEC, Inc.
    d. O-Z/Gedney; a brand of Emerson Industrial Automation.
2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. GRC: Comply with ANSI C80.1 and UL 6.

4. EMT: Comply with ANSI C80.3 and UL 797.
5. FMC: Comply with UL 1; zinc-coated steel.
6. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allied Tube & Conduit; a part of Atkore International.
    b. FSR Inc.
    c. NEC, Inc.
    d. O-Z/Gedney; a brand of Emerson Industrial Automation.
2. Comply with NEMA FB 1 and UL 514B.
3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Fittings, General: Listed and labeled for type of conduit, location, and use.
5. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
6. Fittings for EMT:

    a. Material: Steel.
    b. Type: compression.

7. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
8. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

C. Joint Compound for GRC,: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Crouse-Hinds, an Eaton business.
2. EGS/Appleton Electric.
3. FSR Inc.
4. Hoffman; a brand of Pentair Equipment Protection.
5. Hubbell Incorporated.
6. O-Z/Gedney; a brand of Emerson Industrial Automation.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

E. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

G. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).

H. Gangable boxes are allowed.

I. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC.
2. Concealed Conduit, Aboveground: GRC.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

4. Boxes and Enclosures, Aboveground: NEMA 250, Type 4.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
   a. Mechanical rooms.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: GRC.
7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in damp or wet locations.

C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Install surface raceways only where indicated on Drawings.

3.2 INSTALLATION

A. Comply with requirements in other section for "Hangers and Supports for Electrical Systems" for hangers and supports.

B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.

D. Do not fasten conduits onto the bottom side of a metal deck roof.

E. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

F. Complete raceway installation before starting conductor installation.

G. Arrange stub-ups so curved portions of bends are not visible above finished slab.

H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.

I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.

J. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

K. Support conduit within 12 inches (300 mm) of enclosures to which attached.

L. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

M. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

N. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

O. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

P. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

Q. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

R. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

S. NFPA 70.

T. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
   1. Conduit extending from interior to exterior of building.
   2. Where otherwise required by NFPA 70.

U. Expansion-Joint Fittings:

   1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C) and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC conduit that is located where

environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).

2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
    d. Attics: 135 deg F (75 deg C) temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

V. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 36 inches (915 mm) of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

W. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

X. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

Y. Locate boxes so that cover or plate will not span different building finishes.

Z. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

AA. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install 0sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in other section for "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in other section for "Penetration Firestopping."

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

END OF SECTION 260533

SECTION 264113 – LIGHTNING PROTECTION FOR STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

SUMMARY

A. Furnish all labor, components and items of service required for the completion of a functional and unobtrusive lightning protection system.

B. If any departures from the contract drawings are deemed necessary by the contractor, submit details of such departures and reasons as soon as possible to the architect for approval. No such departures shall be made without the prior written approval of the architect.

1.2 QUALITY ASSURANCE

A. A national testing laboratory (Underwriters Laboratories or Applied Research Laboratories) shall list the components and provide certification of the lightning protection system installation (inspect and certify) for compliance with applicable standards.

B. The system shall be the standard product of a manufacturer regularly engaged in the production of lightning protection systems and shall be the manufacturer's latest approved design.

C. All components specified for this work shall be manufactured by Heary Bros. Lightning Protection Co., Inc., Springville, New York, or approved equal. The equipment manufacturer shall be an approved manufacturer. For approval of a manufacturer other than specified, proposed component data and installation drawings must be submitted for review not less than 10 days prior to bid.

1.3 SUBMITTALS

A. Submit complete shop drawings, showing the type, size, cable routings, ground rods and locations of all equipment, to the architect for approval, prior to start of work.

B. Submit samples and pertinent catalog data to the architect for approval upon request.

PART 2 PRODUCTS

2.1 STANDARD

A. All equipment shall be new, the product of a single manufacturer as outlined above, and of a design and construction to suit the application where it is used in accordance with accepted industry standards.

2.2 EQUIPMENT

A. All components shall be aluminum and of the size, weight and construction to suit the application where used in accordance with requirements for Class I structures.
B. Roof conductors shall be aluminum, 24 strands 14-gauge, 98,600 circular mils, net weight 110 lbs. / 1000 ft.

C. Down conductors shall be copper, 29 strands 17-gauge, 65,600 circular mils, net weight 190 lbs./1000ft.
D. Air terminals shall be solid round aluminum bar 1/2” x 12” minimum, and shall project 10" minimum above the object to be protected.
E. Air terminal bases shall be aluminum with bolt pressure cable connectors and shall be securely mounted with stainless steel screws or bolts.
    1. Offset type bases shall be used at parapets and secured with stainless steel screws or anchors.
    2. Adhesive type bases shall be secured with an adhesive compound which is compatible with the roofing system. The roofing manufacturer shall approve the adhesive compound.
F. Ground rods shall be 5/8" x 10'-0" minimum. They shall be connected to the system with a two-bolt copper clamp having a minimum length of 1-1/2" and employing stainless steel cap screws.
G. Cable fasteners shall be substantial in construction, galvanically compatible with the conductor and mounting surface.
H. Bonding devices, cable splicers and connectors shall be of aluminum with bolt pressure cable connectors.
I. Equipment on stacks and chimneys shall be protected from corrosion and sized in accordance with requirements.
J. Bolts, nuts and screws shall be stainless steel.

PART 3 EXECUTION

3.1 INSTALLATION

A. The installation shall be accomplished by an experienced installer. The installer shall work under the direct supervision of a manufacturer as listed above or a qualified distributor of such manufacturer's products.
B. All equipment shall be installed in a neat workmanlike manner in the most inconspicuous manner possible.
C. Provide complete cable network on the roof including; air terminals, splices, bonding connectors and cable downleads to ground rods. Down conductors shall run in 1" PVC conduit concealed within the building construction to ground.
D. The electrical contractor shall furnish and install all necessary PVC conduit and junction boxes.
E. A bimetal transition fitting shall be used where aluminum roof conductor and copper down conductor are spliced together.

3.2 COORDINATION

A. Work with other trades to insure a correct, neat and unobtrusive installation.
B. Assure a sound bond to the main water service and to assure interconnection with other building ground systems, including both telephone and electrical.
C. Install proper arresters on the power and telephone service by either the utility or the electrical contractor as applicable.

3.3 COMPLETION

A. Provide an as-built drawing to the architect, for the owner, upon completion of the installation.
B. Provide certification (UL, ARL or approved equal).

PART 4 ACCEPTABLE MANUFACTURERS AND SUPPLIERS

A. Heary Bros. Lightning Protection Co., Inc. T. 800-421-6141 F. 716-941-3828
B. Approved equal

PART 5 INSPECTION AND LISTING LABORATORY

A. Applied Research Laboratories, Inc.
B. Underwriters Laboratories

END OF SECTION

BALTIMORE CITY PUBLIC SCHOOLS

MAYOR OF BALTIMORE & BOARD OF SCHOOL COMMISSIONERS

FACILITIES DESIGN AND CONSTRUCTION

PSC NUMBER : 30.268.21/23 SR

ROOF REPLACEMENT

AT

MT. WASHINGTON SCHOOL #221

LIST OF APPLICABLE CODES

MARYLAND BUILDING PERFORMANCE STANDARDS / MARCH 2019
INTERNATIONAL BUILDING CODE / 2018
NATIONAL ELECTRICAL CODE / 2017
INTERNATIONAL FUEL GAS CODE / 2018
INTERNATIONAL MECHANICAL CODE / 2018
INTERNATIONAL PLUMBING CODE / 2018
INTERNATIONAL FIRE CODE / 2018
INTERNATIONAL ENERGY CONSERVATION CODE / 2018
INTERNATIONAL GREEN CONSTRUCTION CODE / 2018
ADA STANDARDS FOR ACCESSIBLE DESIGN / 2010
MARYLAND ACCESSIBILITY CODE COMAR 09.12.53 / 2012
NFPA 101 LIFE SAFETY CODE / 2018
NFPA 13 & COMAR NFPA 13
NFPA 72 & COMAR NFPA 72
2019 DGS PROCEDURE MANUAL WITH AMENDMENTS

100% CONSTRUCTION DOCUMENTS

12/29/2023

HAZARDOUS MATERIALS NOTE:

"REFER TO SPECIFICATIONS FOR HAZARDOUS MATERIALS WORK TO BE INCLUDED IN PROJECT SCOPE"

VICINITY/ LOCATION MAP

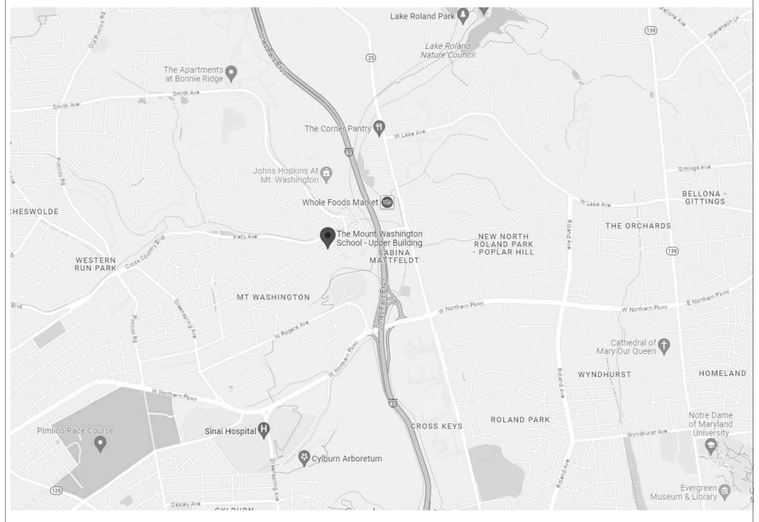

TABLE OF DRAWINGS

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Mayor and City Council of Baltimore City
Board of School Commissioners
Chief Operating Officer: Lynette Boswell Washington, Ph.D.
Executive Director of Facilities Design & Construction: Cynthia Smith, P.E.
Director of Design Operations: Fred D. Mason III, R.A.
Project Engineer: Ebony Johnson

1/25/2024 12:11:42 AM C:\Temp\BCPS Mt. Washington 221 Roof_r23_abennettTT2RP.rvt

THIS SHEET IS 24" X 36" AT FULL SIZE.

Baltimore City Public Schools

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SEAL

STATE OF MARYLAND · VIRGINIA KERSCH · 18330 · ARCHITECT

PROFESSIONAL CERTIFICATION.
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE **PREPARED** OR **APPROVED** BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.
LICENSE NO. 18330
EXPIRATION DATE: 12/09/2023

REVISIONS		
DATE	NO.	ISSUED FOR
09/08/2023	1	60% CONSTRUCTION DOCUMENTS
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/08/2023	3	100% CONSTRUCTION DOCUMENTS

DESIGN BY CK
DRAWN BY AB
CHECK BY SD

COVER SHEET

SCHOOL NUMBER 221

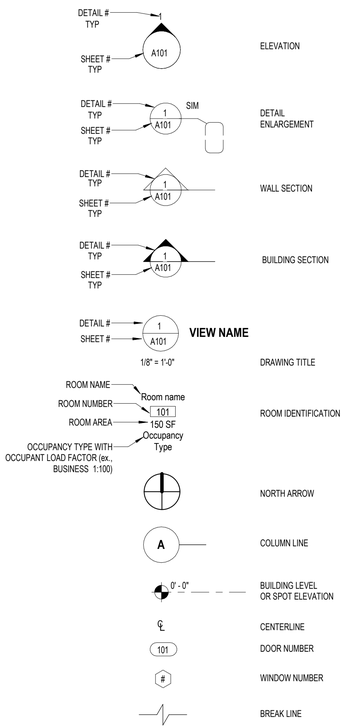
DRAWING NO. **G-001**

STAPLE EDGE

ABBREVIATIONS

ABV	ABOVE	HC	HOLLOW CORE	S	SOUTH
ACOUS	ACOUSTICAL	HCPD	HANDICAPPED	SC	SOLID CORE
AFF	ABOVE FINISHED FLOOR	HDW	HARDWARE	SCHED	SCHEDULE
AGGR	AGGREGATE	HM	HOLLOW METAL	SD	STORM DRAIN
AL. ALUM	ALUMINUM	HORIZ	HORIZONTAL	SECT	SECTION
APPROX	APPROXIMATELY	HPT	HIGH POINT	SHT	SHEET
ARCH	ARCHITECT (URAL)	HT	HEIGHT	SIM	SIMILAR
				SPEC	SPECIFICATION
BBT	BIO-BASED RESILIENT TILE	ID	INSIDE DIAMETER	SQ	SQUARE
BD	BOARD	INSUL	INSULATION	SQ FT	SQUARE FOOT
BITUM	BITUMINOUS	INTR	INTERIOR	SSK	SERVICE SINK
BLDG	BUILDING			SST	STAINLESS STEEL
BLK	BLOCK	JAN	JANITOR	STD	STANDARD
BLKG	BLOCKING	JT	JOINT	STFT	STOREFRONT
BM	BEAM			STL	STEEL
BOT	BOTTOM	KIT	KITCHEN	STOR	STORAGE
BRK	BRICK	KO	KNOCKOUT	STRUCT	STRUCTURAL
BTWN	BETWEEN			SUSP	SUSPENDED
BUR	BUILT-UP ROOF	LAB	LABORATORY		
		LAM	LAMINATE	T&G	TONGUE & GROOVE
C&G	CURB & GUTTER	LAV	LAVATORY	TA	TOILET ACCESSORY
CEM	CEMENT	LH	LEFTHAND	TC	TOP OF CURB
CEM PLAS	CEMENT PLASTER	LPT	LOWPOINT	TEL	TELEPHONE
CER	CERAMIC	LT	LIGHT	TEMP	TEMPORARY
CER TILE	CERMIC TILE	LVR	LOUVER	TERR	TERRAZZO
CL	CENTERLINE			THK	THICKNESS
CLG	CEILING	MACH	MACHINE	THRES	THRESHOLD
CLJ	CONTROL JOINT	MAS, MSNRY	MASONRY	TKBD	TACKBOARD
CLO	CLOSET	MATL	MATERIAL	TP	TOP OF PAVEMENT
CLR	CLEAR	MAX	MAXIMUM	TS	TOP OF STEEL
CMU	CONCRETE MAS UNIT	MECH	MECHANICAL	TW	TOP OF WALL
CO	CLEANOUT	MEMB	MEMBRANE	TYP	TYPICAL
COL	COLUMN	MEP	MECHANICAL / ELECTRICAL / PLUMBING	UC	UNDERCUT
COMB	COMBINATION	MET	METAL	UNFIN	UNFINISHED
CONC	CONCRETE	MFR	MANUFACTURER	UNO	UNLESS NOTED OTHERWISE
CONN	CONNECTION	MH	MANHOLE		
CONSTR	CONSTRUCTION	MIN	MINIMUM, MINUTE	VB	VINYL BASE
CONT	CONTINUOUS	MISC	MISCELANEOUS	VCT	VINYL COMPOSITION TILE
COORD	COORDINATE	MO	MASONRY OPENING	VERT	VERTICAL
CONTR	CONTRACT (OR)	MTD	MOUNTED	VEST	VESTIBULE
CORR	CORRIDOR	MULL	MULLION	VT	VINYL TILE
CSFH	COUNT SUNK FLAT HEAD			VWC	VINYL WALLCOVERING
CSK	COUNTER SUNK	N	NORTH		
		NA	NOT APPLICABLE	W	WEST
DBL	DOUBLE	NIC	NOT IN CONTRACT	W/	WITH
DEPT	DEPARTMENT	NO	NUMBER	WD	WOOD, WIDTH
DET	DETAIL	NOM	NOMINAL	W/O	WIHTOUT
DF	DRINKING FOUNTAIN	NRCA	NATIONAL ROOFING COUNCIL OF AMERICA	WTRPRF	WATERPROOFING
DIA	DIAMETER			WDW	WINDOW
DIM	DIMENSION	NTS	NOT TO SCALE		
DN	DOWN				
DWG	DRAWING	OA	OVERALL		
		OC	ON CENTER		
E	EAST	OCC	OCCUPANT		
EA	EACH	OD	OUTSIDE DIAMETER		
EL	ELEVATION	OFD	OVERFLOW DRAIN		
ELEC	ELECTRICAL	OPNG	OPENING		
ELEV	ELEVATOR	OPP	OPPOSITE		
EMER	EMERGENCY	OVHD	OVERHEAD		
ENCL	ENCOSURE				
EP	ELECTRICAL PANEL	PERF	PERFORATED		
EQ	EQUAL	PLAM	PLASTIC LAMINATE		
EQUIP	EQUIPMENT	PLAS	PLASTER		
EXIST, EX	EXISTING	PLBG	PLUMBING		
EXP JT	EXPANSION JOINT	PLYWD	PLYWOOD		
EXT	EXTERIOR	PNL	PANEL		
		PR	PAIR		
FB	FLAT BAR	PT	PRESSURE TREATED		
FD	FLOOR DRAIN	PTD	PAINTED		
FDN	FOUNDATION	PTN	PARTITION		
FEC	FIRE EXTINGUISHER CABINET				
FE	FIRE EXTINGUISHER	R	RISER		
FH	FLAT HEAD SCREW	RAD	RADIUS		
FHC	FIRE HOSE CABINET	RD	ROOF DRAIN		
FIN	FINISH	REF	REFERENCE		
FIN FL	FINISH FLOOR	REINF	REINFORCEMENT (ING)		
FLR	FLOOR (ING)	REQD	REQUIRED		
FOW	FACE OF WALL	RESIL	RESILIENT		
FT	FEET OR FOOT	RH	RIGHT HAND		
FTG	FOOTING	RM	ROOM		
		RO	ROUGH OPENING		
GA	GAGE	RTU	ROOF TOP MECHANICAL UNIT		
GALV	GALVANIZED				
GEN	GENERAL				
GL	GLAZING				
GWB	GYPSUM WALLBOARD				

SYMBOLS LEGEND



BUILDING ASSEMBLY TYPES LEGEND

- # — WALL AND PARTITION TYPES
- W# — CURTAIN WALL AND STOREFRONT TYPES
- R# — ROOF TYPES
- F# — FLOOR TYPES
- C# — CEILING TYPES

FINISHES, FURNISHINGS AND EQUIPMENT TYPES LEGEND

- BD# — BUILDING DIRECTORY
- CP# — CARPET
- CT# — CERAMIC TILE
- FE# — FIRE EXTINGUISHER CABINET
- GL# — GLAZING
- LV# — LOUVERS AND VENTS
- PL# — PLASTIC LAMINATE
- PS# — PROJECTION SCREEN
- PT# — PAINT - COLOR
- RB# — RESILIENT BASE
- RF# — RESILIENT FLOOR
- SD# — DIMENSIONAL CHARACTER SIGNAGE
- SP# — PANEL TYPE SIGNAGE
- SS# — SOLID SURFACING
- TB# — TACK BOARD
- VD# — VISUAL DISPLAY SURFACE

SCOPE OF WORK

1. REMOVE AND REPLACE EXISITING ROOFING MATERIAL AND INSULATION.
2. REMOVE AND REPLACE EXISTING ROOF CURBS FOR EQUIPMENT MOUNTED ON ROOF.
3. REMOVE AND REPLACE EXISTING FLASHINGS AND ACCESSORIES, METALWORK, ROOF DRAINS, OVERFLOW SCUPPERS AND COPING AS INDICATED.
4. NEW OVERFLOW SCUPPERS SET HIGHER TO ACCOMMODATE THICKER ROOF INSULATION.
5. REMOVE AND REPLACE GUTTERS AND DOWNSPOUTS.
6. REMOVE AND REPLACE EXISTING ROOF HATCHES.
7. REMOVE AND REPLACE FINISHES AND ROOFING AT ALL ENTANCE CANOPIES.
8. REMOVE AND REPLACE MECHANICAL EQUIPMENT AS INDICATED ON PLANS.
9. INSTALL NEW LIGHTNING PROTECTION SYSTEM
10. INSTALL FALL PROTECTION WHERE INDICATED ON PLANS.

CODE ANALYSIS

A AUTHORITIES HAVING JURISDICTION

STATE OF MARYLAND
BALTIMORE CITY

B APPLICABLE CODES

MARYLAND BUILDING PERFORMANCE STANDARDS / MARCH 2019

INTERNATIONAL BUILDING CODE / 2018

INTERNATIONAL EXISTING BUILDING CODE / 2018

NATIONAL ELECTRICAL CODE / 2017

INTERNATIONAL FUEL GAS CODE / 2018

INTERNATIONAL MECHANICAL CODE / 2018

INTERNATIONAL PLUMBING CODE / 2018

INTERNATIONAL PROPERTY MAINTENANCE CODE / 2018

INTERNATIONAL FIRE CODE / 2018

INTERNATIONAL ENERGY CONSERVATION CODE / 2018

INTERNATIONAL GREEN CONSTRUCTION CODE / 2018

MARYLAND ACCESSIBLILITY CODE - MAC

MARYLAND ACCESSIBILITY CODE (MAC) COMAR 09.12.53

2010 ADA STANDARDS FOR ACCESSIBILITY DESIGN

MARYLAND STATE FIRE PREVENTION CODE

LIFE SAFETY - NFPA 101 2018 WITH STATE FIRE MARSHAL MODIFICATIONS

C FIRE PROTECTION SYSTEMS

AUTOMATIC SPRINKLER SYSTEM - IBC 903.1 - EXISTING TO REMAIN - NOT CHANGED

NATIONAL FIRE ALARM AND SYGNALING CODE - NFPA 72 - EXISTING TO REMAIN - NOT CHANGED

PORTABLE FIRE EXTINGUISHERS - IBC 906 - EXISTING TO REMAIN - NOT CHANGED

D USE GROUP/OCCUPANCY AND CONSTRUCTION TYPE

CONSTRUCTION TYPE (IBC TABLE 601): IIB - EXISTING TO REMAIN - NOT CHANGED

USE GROUP/OCCUPANCY: EDUCATION GROUP E - EXISTING TO REMAIN - NOT CHANGED

BUILDING HEIGHT LIMITATION (IBC TABLE 504.3): EXISTING TO REMAIN - NOT CHANGED

ALLOWABLE HEIGHT INCREASE (IBC SECTION 504): EXISTING TO REMAIN - NOT CHANGED

ACTUAL HEIGHT: EXISTING TO REMAIN - NOT CHANGED

BUILDING AREA LIMITATION (IBC TABLE 506.2): EXISTING TO REMAIN - NOT CHANGED

ACTUAL BUILDING AREA: EXISTING TO REMAIN - NOT CHANGED

E MEANS OF EGRESS ANALYSIS

- NO CHANGE TO OCCUPANCY OR OCCUPANT LOAD
- NO CHANGE TO EXISTING MEANS OF EGRESS SYSTEMS OR COMPONENTS.
- EXISTING CORRIDORS AND EXITS TO REMAIN AS-IS.

OCCUPANT LOAD CALCULATION (IBC 1004): EXISTING TO REMAIN - NOT CHANGED

NUMBER OF EXITS REQUIRED (IBC 1006): 4
NUMBER OF EXITS PROVIDED: EXISTING TO REMAIN - NOT CHANGED

EGRESS CAPACITY REQUIRED (NFPA 101 7.3.3.1 OR 7.3.3.2): 17 INCHES
EGRESS CAPACITY PROVIDED: EXISTING TO REMAIN - NOT CHANGED

COMMON PATH OF EGRESS TRAVEL (IBC 1006): 75 FEET
COMMON PATH OF EGRESS TRAVEL PROVIDED: EXISTING TO REMAIN - NOT CHANGED

EXIT ACCESS TRAVEL DISTANCE (IBC TABLE 1017.2): 200 FEET WITHOUT SPRINKLER SYSTEM
EXIT ACCESS TRAVEL DISTANCE PROVIDED: EXISTING TO REMAIN - NOT CHANGED

MINIMUM CORRIDOR WIDTH (IBC TABLE 1020.2): 72 INCHES
CORRIDOR WIDTH PROVIDED: EXISTING TO REMAIN - NOT CHANGED

MAXIMUM DEAD END CORRIDOR LENGTH (IBC 1020.4): 20 FEET
MAXIMUM DEAD END CORRIDOR LENGTH PROVIDED: EXISTING TO REMAIN - NOT CHANGED

F FIRE RESISTANCE RATINGS FOR BUILDING ELEMENTS

IBC TABLE 601

PRIMARY STRUCTURAL FRAME	0 HR
BEARING WALLS - EXTERIOR	0 HR
BEARING WALLS - INTERIOR	0 HR
NON BEARING WALLS AND PARTITIONS - EXTERIOR	0 HR
NON BEARING WALLS AND PARTITIONS - INTERIOR	0 HR
FLOOR CONSTRUCTION	0 HR
ROOF CONSTRUCTION	0 HR

NO CHANGE TO EXISTING BUILDING ELEMENTS

GENERAL NOTES

1. LARGE SCALE DRAWINGS TAKE PRECEDENCE OVER SMALL SCALE DRAWINGS AND DETAILS TAKE PRECEDENCE OVER ALL DRAWINGS. CONTRACTOR SHALL NOTIFY ARCHITECT IN WRITING OF ANY DISCREPANCIES.

2. "TYPICAL" OR "TYP_" SHALL MEAN THAT THE CONDITION IS REPRESENTATIVE FOR SIMILAR CONDITIONS THROUGHOUT, UNLESS NOTED OTHERWISE. DETAILS ARE USUALLY KEYED AND NOTED "TYP." ONLY ONCE, WHERE THEY FIRST OCCUR.

3. CONTRACTOR SHALL NOT MEASURE THESE DRAWINGS FOR THE PURPOSE OF CONSTRUCTION.

4. THE CONTRACTOR SHALL VERIFY THAT DRAWINGS ARE THE LATEST ISSUE PRIOR TO COMMENCING BIDDING OR CONSTRUCTION.

5. THE CONTRACTOR SHALL APPLY, INSTALL, CONNECT, ERECT, CLEAN AND /OR CONDITION MANUFACTURED ARTICLES, MATERIALS, AND /OR EQUIPMENT PER MANUFACTURER'S INSTRUCTIONS. IN A CASE OF CONFLICT BETWEEN MANUFACTURER'S INSTRUCTIONS AND THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL OBTAIN WRITTEN CLARIFICATION FROM THE ARCHITECT BEFORE PROCEEDING.

6. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS PRIOR TO COMMENCING THE WORK TO THE EXTENT PRACTICAL. ANY CONFLICTS, AND DISCREPANCIES SHALL BE REPORTED IN WRITING TO THE ARCHITECT.

7. IMMEDIATELY PRIOR TO THE OWNER'S OCCUPANCY, THE CONTRACTOR SHALL CLEAN ALL SURFACES OF DUST, DEBRIS, LOOSE CONSTRUCTION MATERIAL AND EQUIPMENT, AND LEAVE ALL FLOORS VACUUMED CLEAN. REMAINING CONSTRUCTION MATERIAL AND EQUIPMENT, IF ANY, SHALL BE MOVED AND TEMPORARILY SECURED IN AN AREA DIRECTED BY THE TENANT.

8. THE CONTRACTOR SHALL FILE, OBTAIN, AND PAY FOR ALL FEES FOR BUILDING DEPARTMENT APPROVALS AND PERMITS, WHERE REQUIRED, AND FINAL WRITE-OFFS FOR PROJECT COMPLETION. COPIES OF ALL TRANSACTIONS ARE TO BE FORWARDED TO THE OWNER.

9. THE CONTRACTOR SHALL EXECUTE ALL INSPECTIONS NECESSARY TO OBTAIN A CERTIFICATE OF OCCUPANCY.

10. ALL DIMENSIONS, NOTES, FINISHES, AND FIXTURES SHOWN ON TYPICAL FLOOR PLANS, SECTIONS, OR DETAILS SHALL APPLY TO ALL SIMILAR OR OPPOSITE HAND PLANS, SECTIONS OR DETAILS.

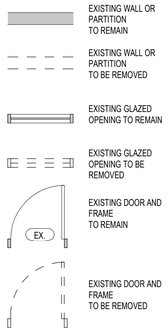
11. DRAWINGS AND SPECIFICATIONS ARE AND SHALL REMAIN THE PROPERTY OF WALDON STUDIO ARCHITECTS & PLANNERS, PC AND ARE NOT TO BE USED BY CLIENT OR CONTRACTOR ON OTHER PROJECTS OR EXTENSIONS TO THIS PROJECT EXCEPT BY AGREEMENT IN WRITING FROM WALDON STUDIO ARCHITECTS & PLANNERS, PC.

MATERIAL LEGEND

TYPICAL MATERIAL HATCH PATTERNS UNLESS NOTED OTHERWISE IN DRAWINGS. THIS LEGEND IS NOT TO SCALE

- EARTH
- CONCRETE
- BRICK
- CMU
- GROUT
- STONE
- STEEL
- ALUMINUM
- PLYWOOD
- SOLID WOOD
- RIGID INSULATION
- BLANKET INSULATION
- GYPSUM
- GRAVEL
- FIRE SAFING
- SAND
- CONTINUOUS BLOCKING
- SUSPENDED ACOUSTIC CEILING TILE
- CERAMIC TILE
- WALK PAD

FLOOR PLAN LEGEND



MICHAEL GRAVES

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NATIONAL HARBOR, MD 20745
301-203-1784

REVISIONS		
DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/08/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · SUSAN E. DEMBROW · 18330 · ARCHITECT

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Architect under the laws of the state of Maryland.
License No. 18330, Expiration Date 12/09/2025

SHEET TITLE
CODE ANALYSIS, GENERAL NOTES AND LEGENDS

DRAWN BY	CHECKED BY	SHEET NO
AB	SD	A-001

SET DESCRIPTION: 100% CONSTRUCTION DOCUMENTS
DATE: 12/29/2023

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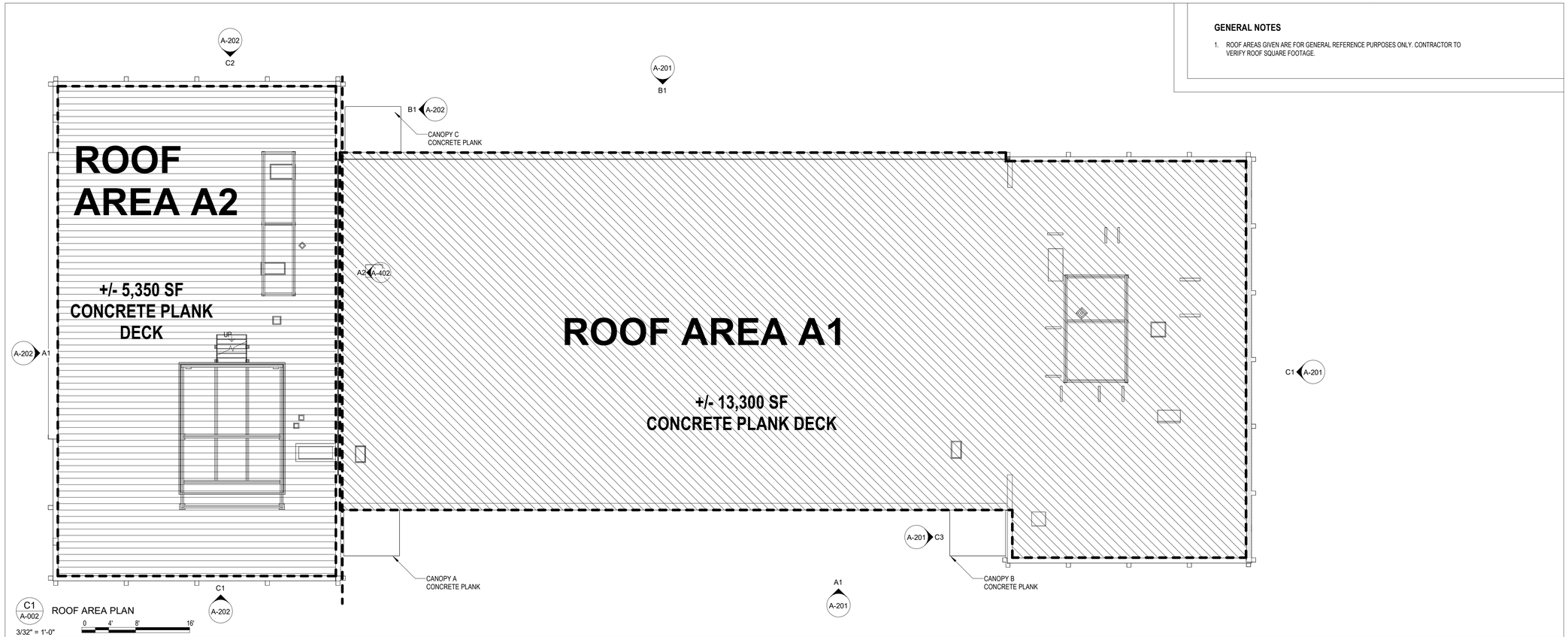
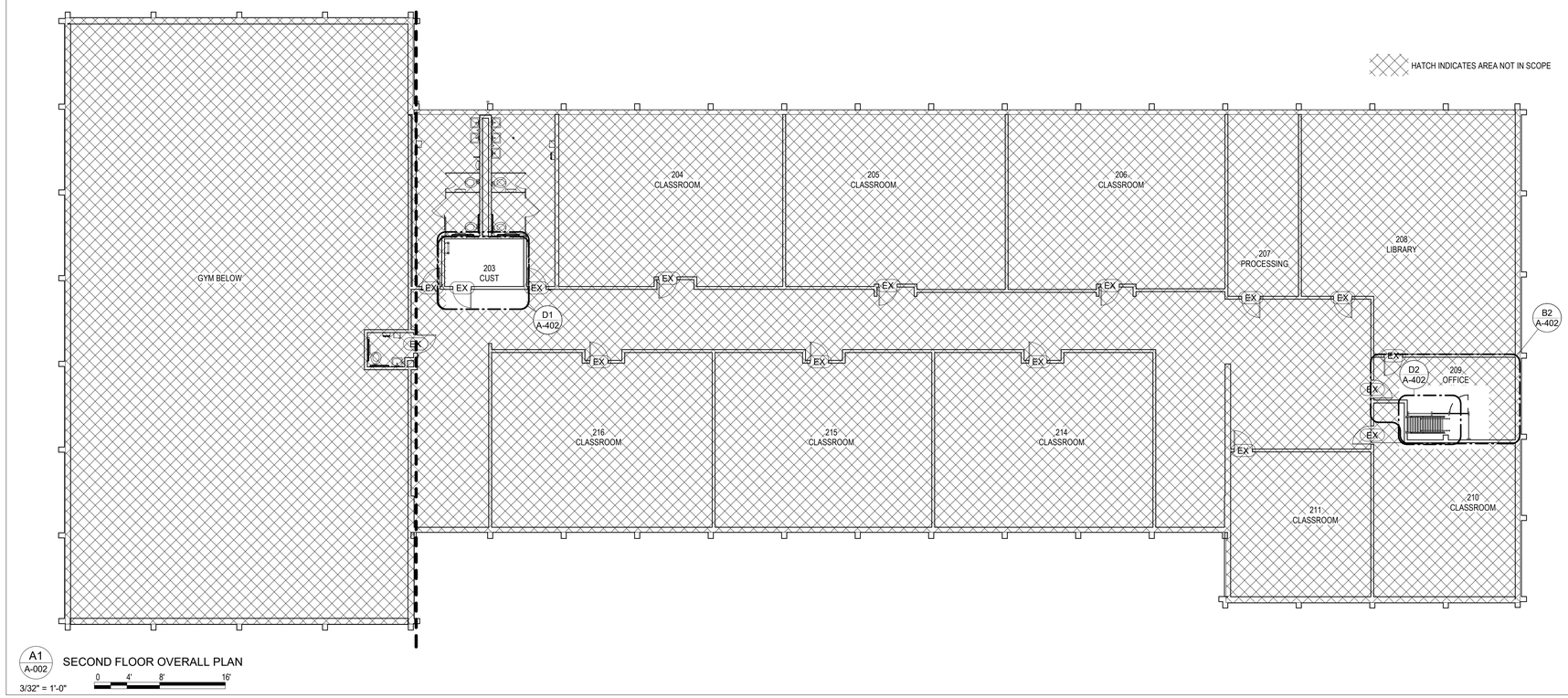
THIS SHEET IS 30" X 42" AT FULL SIZE.





GENERAL NOTES

1. ROOF AREAS GIVEN ARE FOR GENERAL REFERENCE PURPOSES ONLY. CONTRACTOR TO VERIFY ROOF SQUARE FOOTAGE.

MICHAEL GRAVES

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PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · SHARISSA K. REDDICK · 18339 · ARCHITECT

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Architect under the laws of the state of Maryland.
License No. 18339, Expiration Date 12/09/2025

SHEET TITLE
AREA PLANS

DRAWN BY	CHECKED BY
SD	SD

SET DESCRIPTION: 100% CONSTRUCTION DOCUMENTS
DATE: 12/29/2023

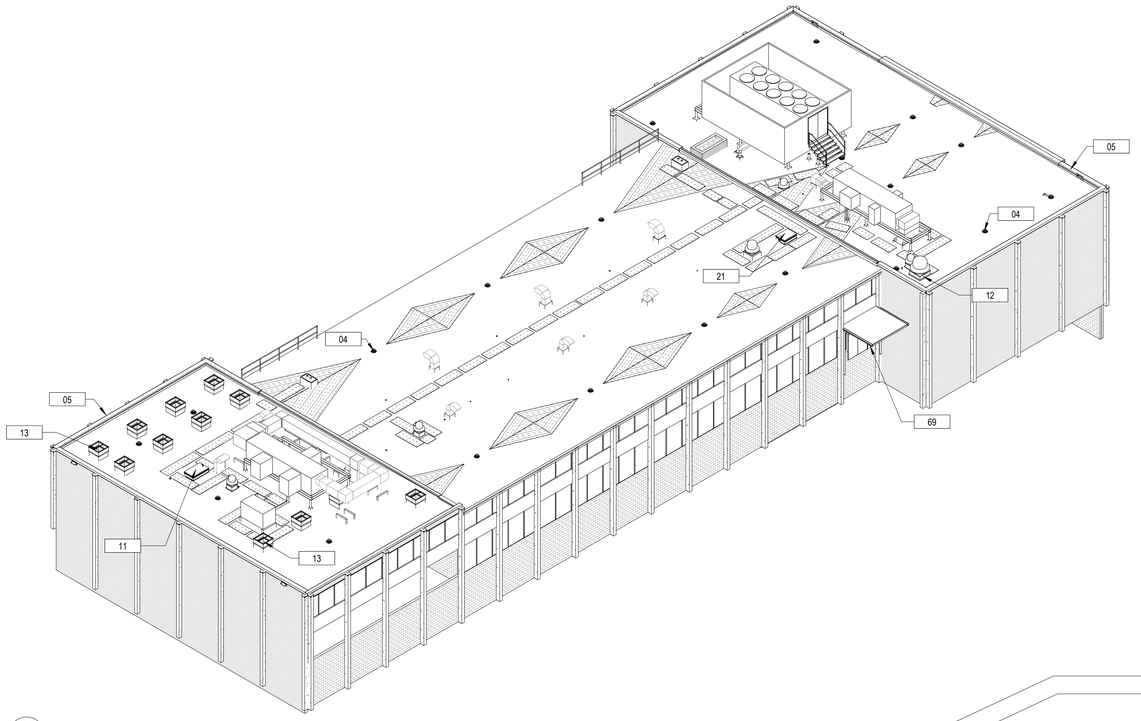
SHEET NO
A-002

STAPLE EDGE

1/25/2024 12:11:45 AM C:\Temp\BCPS Mt Washington 221 Roof_r23_abennettTT2RP.rvt

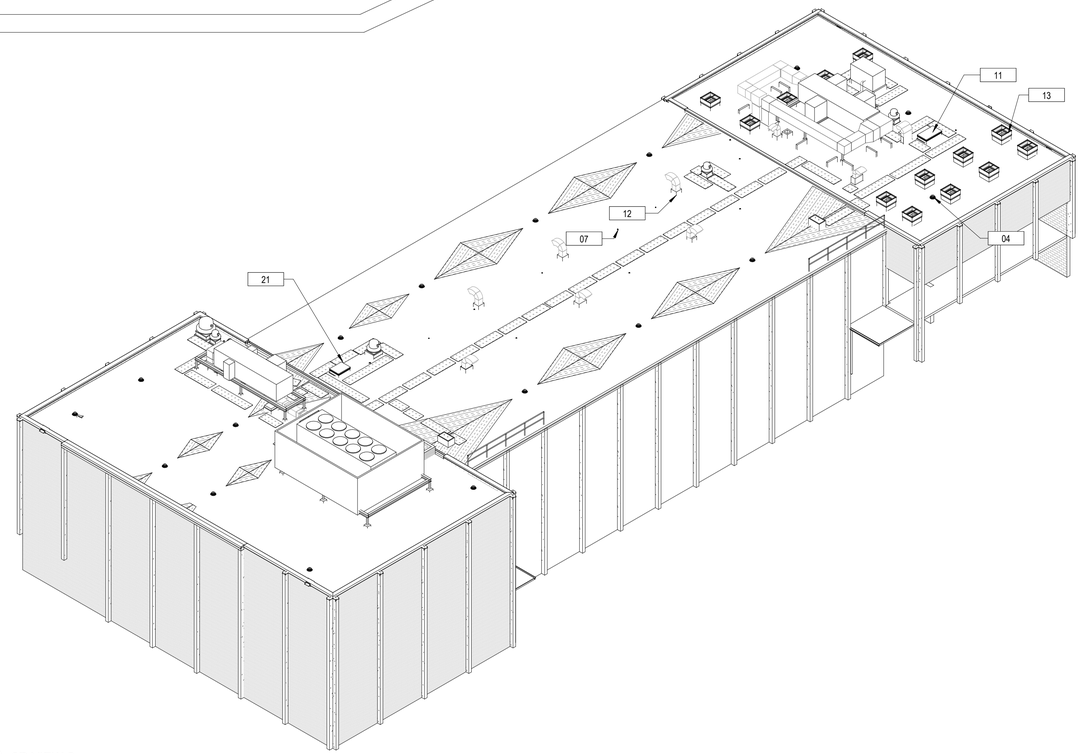
THIS SHEET IS 30" X 42" AT FULL SIZE.

STAPLE EDGE



C1 / A-003 3D VIEW 1

NOT TO SCALE



A1 / A-003 3D VIEW 2

NOT TO SCALE

GENERAL NOTES

1. 3D VIEWS ARE FOR GENERAL REFERENCE PURPOSES ONLY.
2. SEE ALL DRAWINGS FOR COMPLETE SCOPE OF WORK

NEW WORK KEYNOTE LEGEND

KEYNOTE NUMBER	KEYNOTE TEXT
04	NEW ROOF DRAIN AND LEADER IN EXISTING DRAIN LOCATION. COORDINATE SIZE OF DRAIN WITH EXISTING DRAIN PIPE. INSPECT ALL DRAIN PIPES TO 100 FEET FROM ROOF DRAIN TO ENSURE ALL DRAIN LINES ARE FREE AND CLEAR OF OBSTRUCTIONS BEFORE PROCEEDING.
05	NEW PREFINISHED METAL COPING SLOPED TO DRAIN ONTO ROOF.
07	EXTEND TOP OF ALL VENT PIPES 18" ABOVE NEW ROOF SURFACE.
11	NEW 30" X 54" ALUMINUM ROOF HATCH WITH LOCKING HARDWARE. NEW ROOF CURB TO BE 12" ABOVE FINISHED ROOF SURFACE. CONCEAL EXPOSED ROOF DECK AND BLOCKING WITH STAINLESS STEEL SHEET.
12	INSTALL NEW ROOF EQUIPMENT CURB TO 24" MINIMUM ABOVE ROOFING MEMBRANE. INSTALL EQUIPMENT PER MECHANICAL DRAWINGS.
13	PROVIDE NEW CURB WITH TOP OF CURB 24" ABOVE FINISHED ROOF SURFACE. INSTALL NEW SKYLIGHT TO MATCH EXISTING SKYLIGHT DIMENSIONS ON NEW CURB, FLASH ALL AROUND CURB. PROVIDE FALL PROTECTION CAGE. PROVIDE NEW SHADING DEVICE ON INTERIOR.
21	NEW ALUMINUM ROOF HATCH WITH LOCKING HARDWARE. COORDINATE SIZE WITH EXISTING ROOF OPENING. NEW ROOF CURB TO BE 18" ABOVE FINISHED ROOF SURFACE. PROVIDE NEW INTERIOR ALUMINUM LADDER. CONCEAL EXPOSED ROOF DECK AND BLOCKING WITH STAINLESS STEEL SHEET.
69	NEW GUTTER AND DOWNSPOUT, TYPICAL.

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301-203-1784

REVISIONS

DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/08/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · JOSHUA KENDRICK · 78330 · ARCHITECT

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License No. 18330, Expiration Date 12/09/2025

SHEET TITLE
3D VIEWS

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SD	SD

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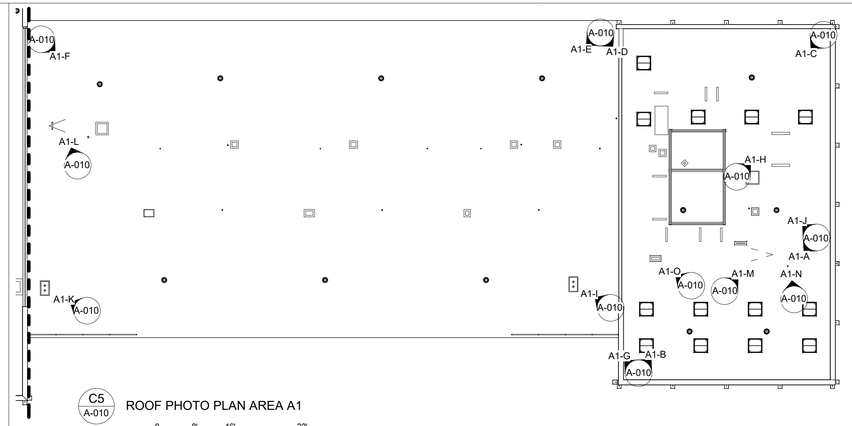
DATE
12/29/2023

SHEET NO
A-003

IMAGE A1-N

IMAGE A1-O



C5 / A-010 ROOF PHOTO PLAN AREA A1

1/16" = 1'-0"

0 8' 16' 32'

GENERAL NOTES

1. PHOTOS ARE FOR GENERAL REFERENCE PURPOSES ONLY. CONTRACTOR TO VERIFY SIZE AND LOCATION OF ALL ROOF TOP EQUIPMENT AND ACCESSORIES PRIOR TO PROVIDING BID PRICING.
2. PHOTOS SHOW EXISTING CONDITIONS. SOME REPLACEMENT ITEMS WILL BE LOCATED IN DIFFERENT LOCATION OR MOUNTED DIFFERENTLY. REFER TO CONTRACT DOCUMENTS.

IMAGE A1-I

IMAGE A1-J

IMAGE A1-K

IMAGE A1-L

IMAGE A1-M

IMAGE A1-E

IMAGE A1-F

IMAGE A1-G

BOTTOM OF PIPE SHALL BE 24" MINIMUM ABOVE NEW ROOF SURFACE.

IMAGE A1-H

IMAGE A1-A

IMAGE A1-B

IMAGE A1-C

IMAGE A1-D

TRUE NORTH

REF. NORTH

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STATE OF MARYLAND · SUSAN DEBORAH KERSHNER · 18330 · ARCHITECT

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SHEET TITLE
PHOTO PLAN - AREA A1

DRAWN BY	CHECKED BY	SHEET NO
SD	SD	A-010

SET DESCRIPTION: 100% CONSTRUCTION DOCUMENTS

DATE: 12/29/2023

STAPLE EDGE

1/25/2024 12:11:59 AM C:\Temp\BCPS Mt Washington 221 Roof_r23_abennettT2RP.rvt

THIS SHEET IS 30"X 42" AT FULL SIZE.

STAPLE EDGE

IMAGE A2-K

IMAGE A2-H

IMAGE A2-I

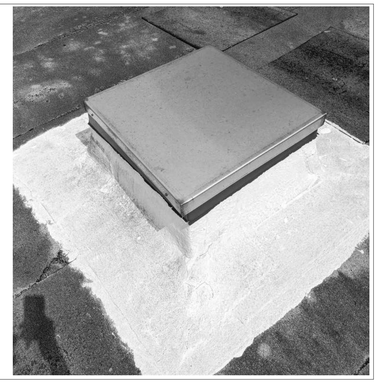

IMAGE A2-J

IMAGE A2-E

IMAGE A2-F

IMAGE A2-G

IMAGE A2-A

IMAGE A2-B

IMAGE A2-C

GENERAL NOTES

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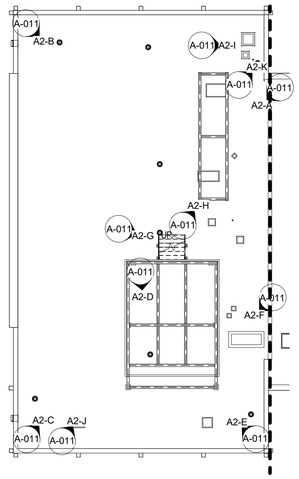

B5 / A-011 ROOF PHOTO PLAN AREA A2

1/16" = 1'-0"

0 8' 16' 32'

IMAGE A2-D

TRUE NORTH

REF. NORTH

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PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · SUSTA KERRIGAN · 18330 · ARCHITECT

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SHEET TITLE
PHOTO PLAN - AREA A2

DRAWN BY SD | CHECKED BY SD
SET DESCRIPTION 100% CONSTRUCTION DOCUMENTS
DATE 12/29/2023
SHEET NO **A-011**

1/25/2024 12:12:06 AM C:\Temp\BCPS Mt Washington 221 Roof_r23_abennettTT2RP.rvt

THIS SHEET IS 30" X 42" AT FULL SIZE

IMAGE C-C1

IMAGE C-C2

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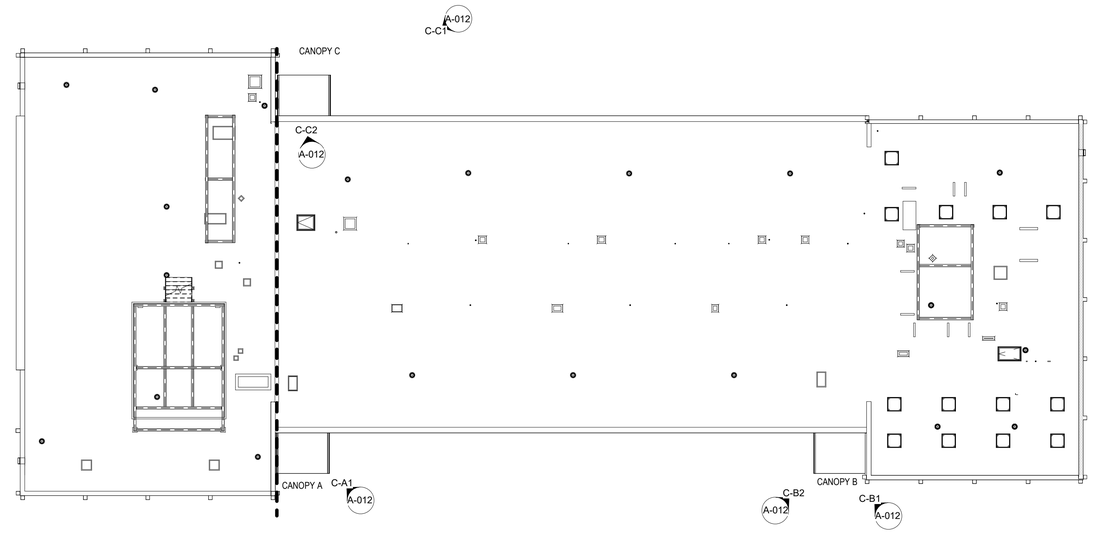

C4 / A-012 ROOF PHOTO PLAN CANOPIES

1/16" = 1'-0" 0 8' 16' 32'

IMAGE C-A1

IMAGE C-B1

IMAGE C-B2

TRUE NORTH

REF. NORTH

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PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · CHRISTINA KERNIGAN · 16330 · ARCHITECT

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SHEET TITLE
PHOTO PLAN - CANOPIES, EXTERIOR

DRAWN BY	CHECKED BY
Author	Checker

SET DESCRIPTION
100% CONSTRUCTION DOCUMENTS

DATE
12/29/2023

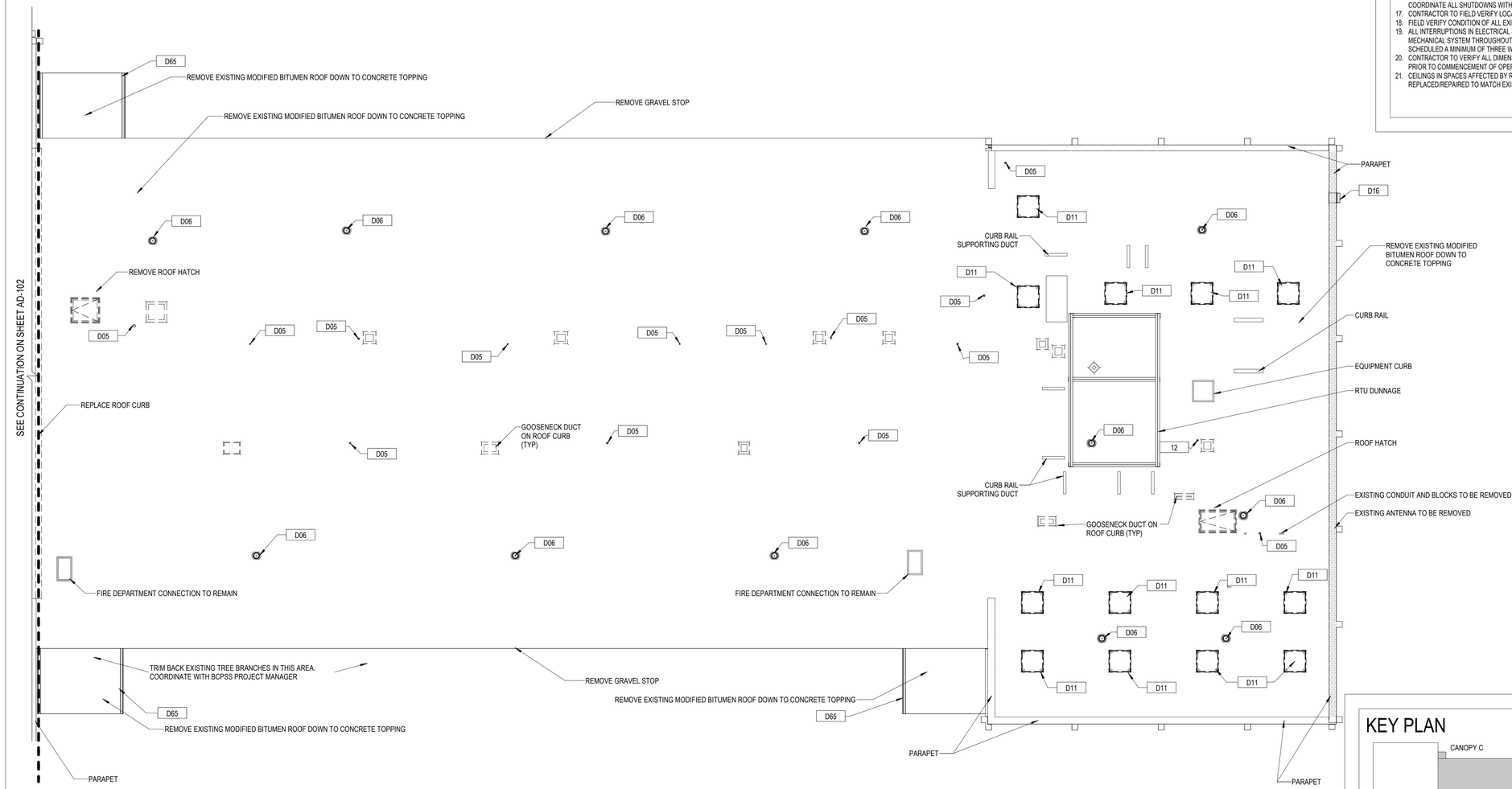
SHEET NO
A-012

STAPLE EDGE

DEMOLITION KEYNOTE LEGEND	
KEYNOTE NUMBER	KEYNOTE TEXT
D05	EXISTING PIPE VENT TO BE EXTENDED TO 18" ABOVE FINISHED ROOF.
D06	REMOVE EXISTING ROOF DRAIN. REMOVE EXISTING TRIM, INSULATION, AND PIPE TO NEAREST INTERIOR JOINT.
D11	REMOVE EXISTING ROOF SKYLIGHT TO SLAB. PREPARE OPENING FOR NEW SKYLIGHT ON NEW CURB. REMOVE EXISTING SHADING DEVICE ON INTERIOR. PATCH AND REPAIR CEILING AS REQUIRED. PREPAIR AREA FOR NEW SHADING DEVICE.
D16	REMOVE EXISTING SCUPPER. PREPARE AREA FOR NEW SCUPPER.
D65	REMOVE EXISTING GUTTER AND DOWNSPOUT.

DEMOLITION NOTES

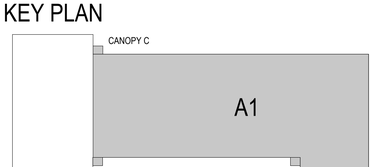
1. COORDINATE HAUL ROUTES, DUMPSTER LOCATIONS, POWER, WATER, SPRINKLER SERVICE INTERRUPTIONS WITH THE TENANT. NOTIFY TENANT AT LEAST 72 HOURS IN ADVANCE OF UTILITY, LIFE SAFETY SYSTEM, OR SPRINKLER INTERRUPTIONS.
2. BE PREPARED TO WORK OFF HOURS TO ACCOMMODATE THE TENANT'S OPERATIONAL REQUIREMENTS.
3. IDENTIFY NOISY WORK EFFORTS WITH TENANT AND SCHEDULE NOISY WORK TO MEET TENANT'S REQUIREMENTS.
4. PROTECT ALL FLOORS, WALLS, AND CEILINGS ALONG HAUL ROUTES TO PREVENT DAMAGE. THE CONTRACTOR WILL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE MADE TO BUILDING ELEMENTS.
5. TENANT WILL REMOVE TENANT-OWNED MOUNTED EQUIPMENT PRIOR TO CONTRACTOR BEING ONSITE.
6. REMOVE ALL EXISTING ELECTRICAL CABLING BACK TO THE NEAREST JUNCTION BOX AND/OR ELECTRICAL PANEL FOR DEVICES IN WALLS OR CEILINGS TO BE DEMOLISHED.
7. REMOVE ALL INACTIVE DATA CABLING AND PROPERLY SUPPORT BOTH EXISTING CABLING TO REMAIN AND NEW CABLING AS REQUIRED.
8. REPAIR ANY EXISTING DAMAGE AND/OR DAMAGE CAUSED BY THE WORK TO FIRE RATED ENCLOSURES, SHAFT WALLS, AND / OR SPRAY-ON FIRE PROOFING ON THE SUPERSTRUCTURE AS REQUIRED. REPAIR AND/OR REPLACE AS REQUIRED TO MAINTAIN FIRE RATINGS.
9. SEQUENCE WORK TO MAINTAIN LIFE SAFETY IN WORK AND ADJACENT NON-WORK AREAS AT ALL TIMES.
10. MAINTAIN CLEAR ACCESS TO EXITS AND PROVIDE TEMPORARY BARRIERS AS REQUIRED TO ENSURE EXIT ACCESS.
11. PREPARE EXISTING-TO-REMAIN ROOF STRUCTURE FOR NEW FINISHES.
12. DEMOLITION SHALL INCLUDE REMOVAL AND OFF-SITE DISPOSAL OF MATERIALS. DO NOT ABANDON IN PLACE ANY MECHANICAL AND RELATED ELECTRICAL COMPONENTS UNLESS OTHERWISE NOTED ON DRAWINGS.
13. PROTECT EXISTING AIR INTAKES DURING DEMOLITION FROM ODORS, DUST & DEBRIS. COORDINATE ALL SHUTDOWNS WITH BCPSS PROJECT MANAGER.
14. PROTECT ALL ROOF DRAINS DURING DEMOLITION AND DO NOT ALLOW DEBRIS TO FALL INTO DRAIN AT ANY POINT DURING THIS CONSTRUCTION PROJECT. SCOPE AND INSPECT ALL ROOF DRAINS FOR PROPER DRAINAGE PRIOR TO PLACEMENT OF NEW MATERIAL.
15. DO NOT STOCK PILE AGGREGATE SURFACING ON ROOF TO CREATE OVERLOADING OF EXISTING ROOF DECKS.
16. PROTECT EXISTING AIR INTAKES DURING DEMOLITION FROM ODORS, DUST & DEBRIS. COORDINATE ALL SHUTDOWNS WITH BCPSS PROJECT MANAGER.
17. CONTRACTOR TO FIELD VERIFY LOCATIONS OF ALL EXISTING ROOF TOP ITEMS.
18. FIELD VERIFY CONDITION OF ALL EXISTING CURB CONSTRUCTION.
19. ALL INTERRUPTIONS IN ELECTRICAL SERVICE TO ROOFTOP EQUIPMENT AS WELL AS MECHANICAL SYSTEM THROUGHOUT THE BUILDING SHALL BE COORDINATED AND SCHEDULED A MINIMUM OF THREE WEEKS IN ADVANCE OF EXPECTED EXECUTION.
20. CONTRACTOR TO VERIFY ALL DIMENSIONS, EXISTING SYSTEMS AND DECK TYPES PRIOR TO COMMENCEMENT OF OPERATIONS.
21. CEILINGS IN SPACES AFFECTED BY ROOF DRAIN AND PIPING REMOVAL TO BE REPLACED/REPAIRED TO MATCH EXISTING.



A1 / AD-101 DEMOLITION ROOF PLAN

1/8" = 1'-0" 0 4' 8' 16'

KEY PLAN



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REVISIONS		
DATE	NO.	ISSUED FOR
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Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · SHERI A. KERCHNER · 18330 · ARCHITECT

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SHEET TITLE
DEMOLITION PLAN AREA A1

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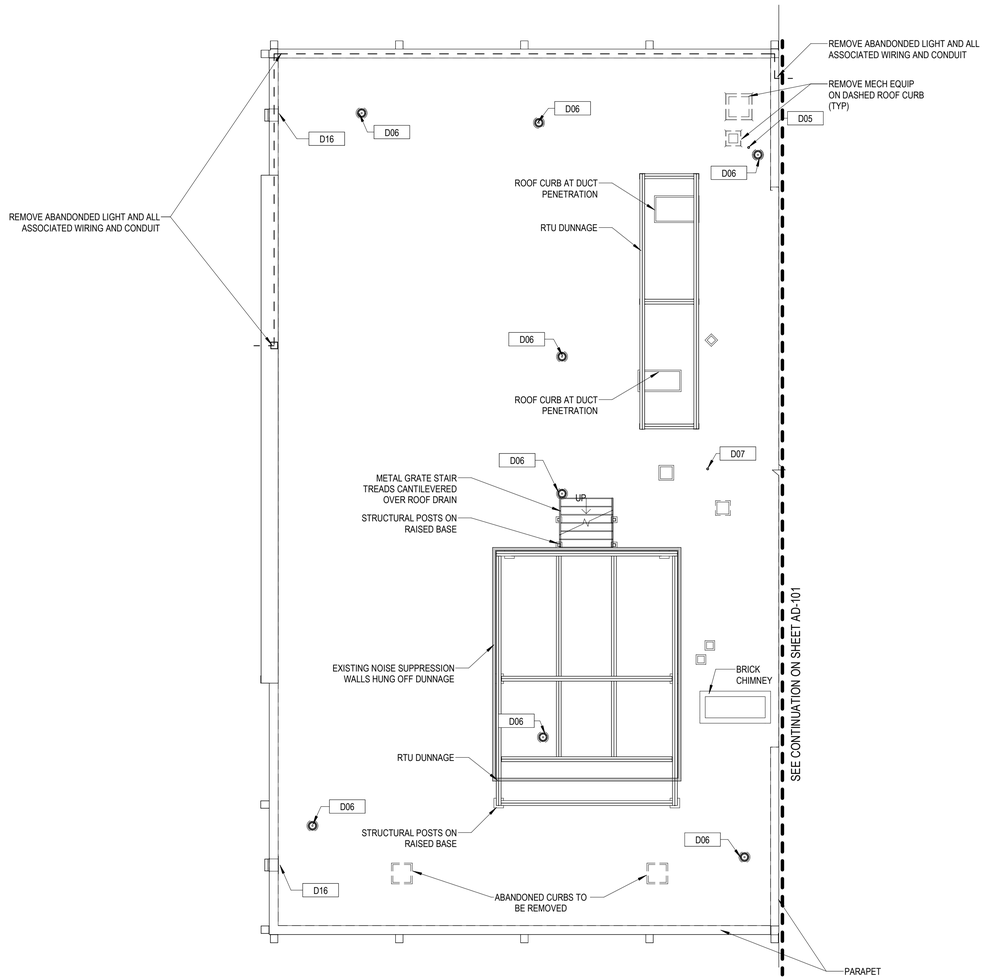
SD	SD

SET DESCRIPTION
100% CONSTRUCTION DOCUMENTS

DATE
12/29/2023

SHEET NO
AD-101

DEMOLITION KEYNOTE LEGEND	
KEYNOTE NUMBER	KEYNOTE TEXT
D05	EXISTING PIPE VENT TO BE EXTENDED TO 18" ABOVE FINISHED ROOF.
D06	REMOVE EXISTING ROOF DRAIN. REMOVE EXISTING TRIM, INSULATION, AND PIPE TO NEAREST INTERIOR JOINT.
D07	REMOVE EXISTING ROOF EQUIPMENT AND CURBS. RAISE EXISTING TO REMAIN EQUIPMENT UP AND MOUNT ON NEW CURBS SIZED TO NEW ROOF INSULATION THICKNESS. RELOCATE REFRIGERANT LINES AND ASSOCIATED ELECTRICAL EQUIPMENT AS NEEDED TO ACCOMMODATE NEW ROOF SYSTEM. NEW CURB TO BE AT LEAST 24" FROM NEW ROOF SURFACE TO TOP OF CURB.
D16	REMOVE EXISTING SCUPPER. PREPARE AREA FOR NEW SCUPPER.



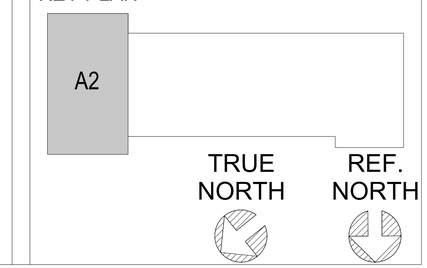
DEMOLITION NOTES

1. COORDINATE HAUL ROUTES, DUMPSTER LOCATIONS, POWER, WATER, SPRINKLER SERVICE INTERRUPTIONS WITH THE TENANT. NOTIFY TENANT AT LEAST 72 HOURS IN ADVANCE OF UTILITY, LIFE SAFETY SYSTEM, OR SPRINKLER INTERRUPTIONS.
2. BE PREPARED TO WORK OFF HOURS TO ACCOMMODATE THE TENANT'S OPERATIONAL REQUIREMENTS.
3. IDENTIFY NOISY WORK EFFORTS WITH TENANT AND SCHEDULE NOISY WORK TO MEET TENANT'S REQUIREMENTS.
4. PROTECT ALL FLOORS, WALLS, AND CEILINGS ALONG HAUL ROUTES TO PREVENT DAMAGE. THE CONTRACTOR WILL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE MADE TO BUILDING ELEMENTS.
5. TENANT WILL REMOVE TENANT-OWNED MOUNTED EQUIPMENT PRIOR TO CONTRACTOR BEING ONSITE.
6. REMOVE ALL EXISTING ELECTRICAL CABLING BACK TO THE NEAREST JUNCTION BOX AND/OR ELECTRICAL PANEL FOR DEVICES IN WALLS OR CEILINGS TO BE DEMOLISHED.
7. REMOVE ALL INACTIVE DATA CABLING AND PROPERLY SUPPORT BOTH EXISTING CABLING TO REMAIN AND NEW CABLING AS REQUIRED.
8. REPAIR ANY EXISTING DAMAGE AND/OR DAMAGE CAUSED BY THE WORK TO FIRE RATED ENCLOSURES, SHAFT WALLS, AND / OR SPRAY-ON FIRE PROOFING ON THE SUPERSTRUCTURE AS REQUIRED. REPAIR AND/OR REPLACE AS REQUIRED TO MAINTAIN FIRE RATINGS.
9. SEQUENCE WORK TO MAINTAIN LIFE SAFETY IN WORK AND ADJACENT NON-WORK AREAS AT ALL TIMES.
10. MAINTAIN CLEAR ACCESS TO EXITS AND PROVIDE TEMPORARY BARRIERS AS REQUIRED TO ENSURE EXIT ACCESS.
11. PREPARE EXISTING-TO-REMAIN ROOF STRUCTURE FOR NEW FINISHES.
12. DEMOLITION SHALL INCLUDE REMOVAL AND OFF-SITE DISPOSAL OF MATERIALS. DO NOT ABANDON IN PLACE ANY MECHANICAL AND RELATED ELECTRICAL COMPONENTS UNLESS OTHERWISE NOTED ON DRAWINGS.
13. PROTECT EXISTING AIR INTAKES DURING DEMOLITION FROM ODORS, DUST & DEBRIS. COORDINATE ALL SHUTDOWNS WITH BCPSS PROJECT MANAGER.
14. PROTECT ALL ROOF DRAINS DURING DEMOLITION AND DO NOT ALLOW DEBRIS TO FALL INTO DRAIN AT ANY POINT DURING THIS CONSTRUCTION PROJECT. SCOPE AND INSPECT ALL ROOF DRAINS FOR PROPER DRAINAGE PRIOR TO PLACEMENT OF NEW MATERIAL.
15. DO NOT STOCK PILE AGGREGATE SURFACING ON ROOF TO CREATE OVERLOADING OF EXISTING ROOF DECKS.
16. PROTECT EXISTING AIR INTAKES DURING DEMOLITION FROM ODORS, DUST & DEBRIS. COORDINATE ALL SHUTDOWNS WITH BCPSS PROJECT MANAGER.
17. CONTRACTOR TO FIELD VERIFY LOCATIONS OF ALL EXISTING ROOF TOP ITEMS.
18. FIELD VERIFY CONDITION OF ALL EXISTING CURB CONSTRUCTION.
19. ALL INTERRUPTIONS IN ELECTRICAL SERVICE TO ROOFTOP EQUIPMENT AS WELL AS MECHANICAL SYSTEM THROUGHOUT THE BUILDING SHALL BE COORDINATED AND SCHEDULED A MINIMUM OF THREE WEEKS IN ADVANCE OF EXPECTED EXECUTION.
20. CONTRACTOR TO VERIFY ALL DIMENSIONS, EXISTING SYSTEMS AND DECK TYPES PRIOR TO COMMENCEMENT OF OPERATIONS.
21. CEILINGS IN SPACES AFFECTED BY ROOF DRAIN AND PIPING REMOVAL TO BE REPLACED/REPAIRED TO MATCH EXISTING.

A1 / AD-102 DEMOLITION ROOF PLAN A2

1/8" = 1'-0" 0 8' 16' 32'

KEY PLAN



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STATE OF MARYLAND · SUSAN A KERSCH · 18330 · ARCHITECT

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Architect under the laws of the state of Maryland.
License No. 18330, Expiration Date 12/09/2025

SHEET TITLE
DEMOLITION PLANS AREA A2

DRAWN BY	CHECKED BY
SD	SD

SET DESCRIPTION
100% CONSTRUCTION DOCUMENTS

DATE
12/29/2023

SHEET NO
AD-102

STAPLE EDGE

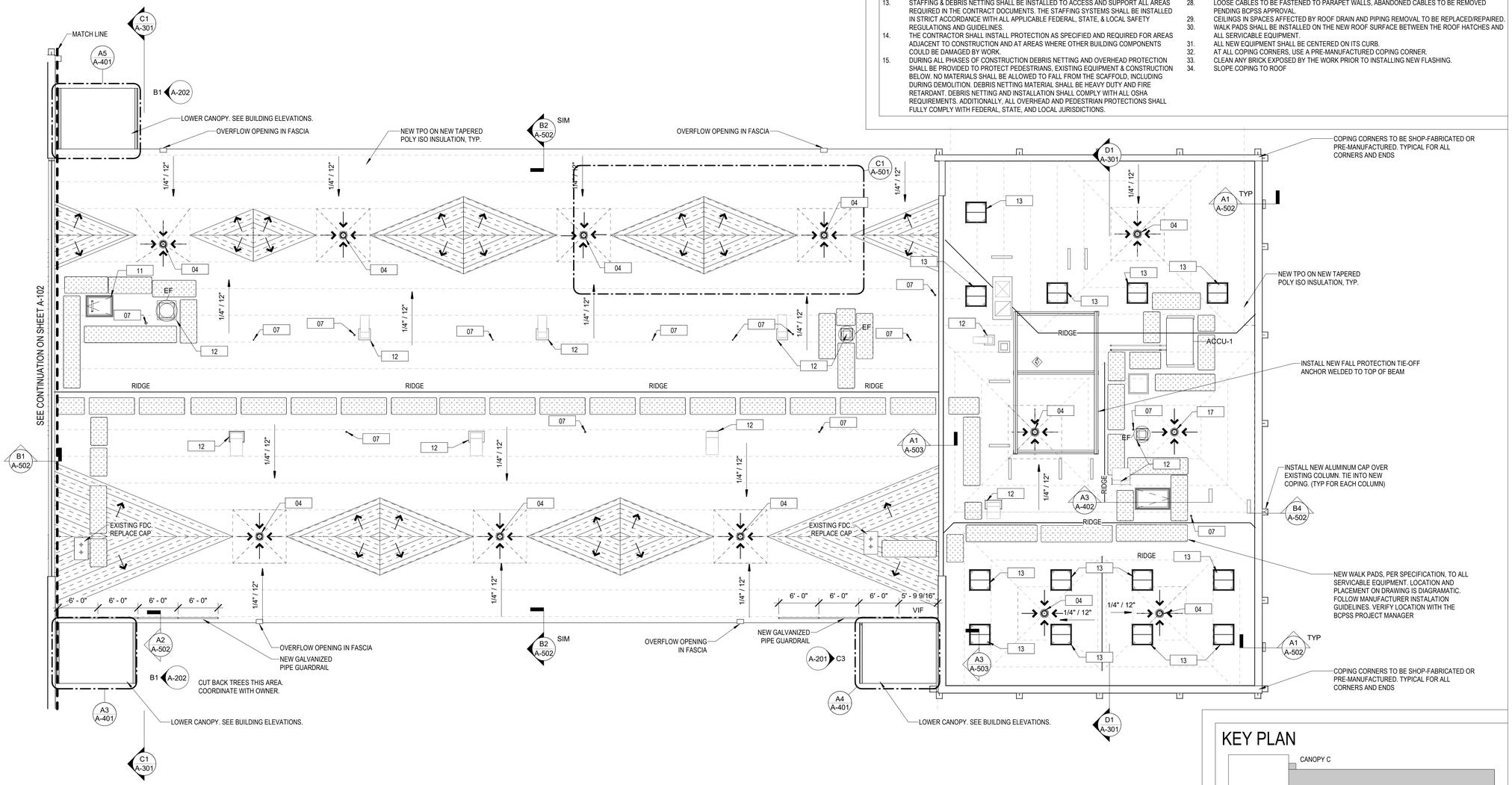
1/25/2024 12:12:12 AM C:\Temp\BCPS Mt Washington 221 Roof_r23_abennettTT2RP.rvt

THIS SHEET IS 30" X 42" AT FULL SIZE

NEW WORK KEYNOTE LEGEND	
KEYNOTE NUMBER	KEYNOTE TEXT
04	NEW ROOF DRAIN AND LEADER IN EXISTING DRAIN LOCATION. COORDINATE SIZE OF DRAIN WITH EXISTING DRAIN PIPE. INSPECT ALL DRAIN PIPES TO 100 FEET FROM ROOF DRAIN TO ENSURE ALL DRAIN LINES ARE FREE AND CLEAR OF OBSTRUCTIONS BEFORE PROCEEDING.
07	EXTEND TOP OF ALL VENT PIPES 18" ABOVE NEW ROOF SURFACE.
11	NEW 30" X 54" ALUMINUM ROOF HATCH WITH LOCKING HARDWARE. NEW ROOF CURB TO BE 12" ABOVE FINISHED ROOF SURFACE. CONCEAL EXPOSED ROOF DECK AND BLOCKING WITH STAINLESS STEEL SHEET.
12	INSTALL NEW ROOF EQUIPMENT CURB TO 24" MINIMUM ABOVE ROOFING MEMBRANE. INSTALL EQUIPMENT PER MECHANICAL DRAWINGS.
13	PROVIDE NEW CURB WITH TOP OF CURB 24" ABOVE FINISHED ROOF SURFACE. INSTALL NEW SKYLIGHT TO MATCH EXISTING SKYLIGHT DIMENSIONS ON NEW CURB, FLASH ALL AROUND CURB. PROVIDE FALL PROTECTION CAGE. PROVIDE NEW SHADING DEVICE ON INTERIOR.
17	NEW ROOF DRAIN AND LEADER IN NEW LOCATION. CONNECT TO EXISTING DRAIN LINE. COORDINATE SIZE OF DRAIN WITH EXISTING DRAIN PIPE. INSPECT ALL DRAIN PIPES TO 100 FEET FROM ROOF DRAIN TO INSURE ALL DRAIN LINES ARE FREE AND CLEAR OF OBSTRUCTIONS BEFORE PROCEEDING.

GENERAL NOTES

1. INFORMATION SHOWN ON THIS DRAWING PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS OR GENERAL FIELD OBSERVATIONS AND MAY NOT INDICATE ACTUAL EXISTING CONDITIONS IN DETAIL OR DIMENSION. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ARCHITECT IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.
2. ROOF ELEVATIONS ARE APPROXIMATE, CONTRACTOR TO VERIFY IN FIELD.
3. APPLY HIGH DENSITY POLY ISO COVER BOARD TO ANY ROUGH WALL SURFACES TO ADHERE TPO MEMBRANE TO WALL.
4. ALL EQUIPMENT CURB FLASHING & THROUGH WALL FLASHING & COUNTER FLASHING TO BE STAINLESS STEEL.
5. CONTRACTOR TO INCLUDE 250 SF OF BRICK REPAIR AND 250 SF OF BRICK REPOINTING.
6. CEILINGS IN SPACES AFFECTED BY ROOF DRAIN AND PIPING REMOVAL TO BE REPLACED/ REPAIRED.
7. DURING CONSTRUCTION, THE WORK AREA SHALL BE FENCED OR BARRICADED TO PREVENT PEDESTRIAN ACCESS WITHIN 30 FEET OF THE WORK. IT IS ANTICIPATED THAT THE WORK AREA BARRICADES WILL BE MOVED AS THE WORK PROGRESSES. EQUIP WITH GATES AND LOCKS. FENCE SHALL BE KEPT IN GOOD REPAIR & FREE OF GRAFFITI.
8. THE CONTRACTOR SHALL PROVIDE OVERHEAD PROTECTION AND BARRIER FENCING AS REQUIRED BY CODE.
9. CONTRACTOR SHALL PROTECT EXISTING PLANT MATERIALS.
10. CONTRACTOR SHALL KEEP ALL SURROUNDING AREA AND DRAINAGE SYSTEMS FREE FROM CONSTRUCTION DEBRIS AT ALL TIMES.
11. ACCESS TO WORK AREAS SHALL BE FROM THE DESIGNATED CONSTRUCTION AREAS. CONSTRUCTION SIGNS, TRAFFIC SIGNS, AND SAFETY SIGNS SHALL BE PREPARED PRIOR TO REPAIR WORK. WORKERS SHALL KEEP CONSTRUCTION SAFETY REGULATIONS AND GUIDELINES IN ACCORDANCE WITH FEDERAL, STATE & LOCAL JURISDICTIONS.
12. CONTRACTOR IS RESPONSIBLE FOR DESIGN, CONSTRUCTION, DEMOLITION AND ALL COSTS ASSOCIATED WITH THE SCAFFOLDING.
13. STAFFING & DEBRIS NETTING SHALL BE INSTALLED TO ACCESS AND SUPPORT ALL AREAS REQUIRED IN THE CONTRACT DOCUMENTS. THE STAFFING SYSTEMS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, & LOCAL SAFETY REGULATIONS AND GUIDELINES.
14. THE CONTRACTOR SHALL INSTALL PROTECTION AS SPECIFIED AND REQUIRED FOR AREAS ADJACENT TO CONSTRUCTION AND AT AREAS WHERE OTHER BUILDING COMPONENTS COULD BE DAMAGED BY WORK.
15. DURING ALL PHASES OF CONSTRUCTION DEBRIS NETTING AND OVERHEAD PROTECTION SHALL BE PROVIDED TO PROTECT PEDESTRIANS, EXISTING EQUIPMENT & CONSTRUCTION BELOW. NO MATERIALS SHALL BE ALLOWED TO FALL FROM THE SCAFFOLD, INCLUDING DURING DEMOLITION. DEBRIS NETTING MATERIAL SHALL BE HEAVY DUTY AND FIRE RETARDANT. DEBRIS NETTING AND INSTALLATION SHALL COMPLY WITH ALL OSHA REQUIREMENTS. ADDITIONALLY, ALL OVERHEAD AND PEDESTRIAN PROTECTIONS SHALL FULLY COMPLY WITH FEDERAL, STATE, AND LOCAL JURISDICTIONS.
16. CONTRACTOR SHALL PROVIDE AND MAINTAIN ACCESS TO FIRE HYDRANTS AND KEEP ALL HYDRANTS FREE OF OBSTRUCTIONS. AN UNOBSTRUCTED RADIUS OF FIVE FEET MUST BE MAINTAINED AROUND ANY FIRE HYDRANT WITHIN AREAS OF OPERATIONS.
17. ACCESS MUST BE MAINTAINED TO BOTH FDC STANDPIPE CONNECTIONS FOR THE BUILDING. ANY FIRE DEPARTMENT CONNECTION ACCESS DOORS MUST BE MARKED WITH APPROPRIATE SIGNAGE.
18. LOCATIONS FOR STORAGE AND STOCKPILING OF MATERIALS ON-SITE SHALL BE CONFINED TO THE AREAS DIRECTED BY THE OWNER.
19. REASONABLE MEASURES MUST BE TAKEN TO LIMIT UNAUTHORIZED ACCESS TO SCAFFOLDING AND ROOF AREAS.
20. CONTRACTOR TO FIELD VERIFY LOCATIONS OF ALL EXISTING ROOF TOP ITEMS. COORDINATE ALL NEW WORK WITH MECHANICAL, ELECTRICAL, PLUMBING & DEMOLITION WORK PRIOR TO PROVIDING BID PRICING.
21. COVER AND WEIGHT DOWN ALL MATERIALS LEFT ON ROOF DURING CONSTRUCTION.
22. COORDINATE ALL STAGING AREAS WITH THE OWNER.
23. NO STAGING AREAS PERMITTED ON SERVICE DRIVES OF THE BUILDING U.O.N.
24. CONTRACTORS ARE TO KEEP STAGING AREAS IN A NEAT AND ORDERLY MANNER FOLLOWING MANUFACTURER'S RECOMMENDED METHODS OF KEEPING MATERIALS OFF OF DIRECT CONTACT WITH THE GROUND.
25. ALL STAGING AREAS TO BE ENCLOSED WITH A 6'-0" HIGH NON-PENETRATING FENCE WITH POSTS NO MORE THAN 5'-0" O.C. CONTRACTOR TO PROVIDE CONSTRUCTION BARRIERS AROUND STAGING AND WORK AREAS AND TO GENERALLY KEEP THESE AREAS BETWEEN THE BUILDING AND ADJACENT SIDEWALKS CLEAN.
26. ALL ROOF PENETRATIONS ARE SHOWN IN APPROXIMATE LOCATIONS. CONTRACTOR IS RESPONSIBLE TO REVIEW ALL DRAWINGS FOR THIS PROJECT AND PROVIDE FLASHING FOR ALL ROOF PENETRATIONS, NOTED OR NOT.
27. CONTRACTOR TO REMOVE AND REINSTALL ALL WALL MOUNTED LIGHTS, CONDUITS, PIPE, EXPOSED CABLING, SENSORS, BRACKETS, LIGHTNING PROTECTION, ETC. TO PERFORM THE WORK. CONTRACTOR IS TO REPLACE ALL BROKEN OR MISSING COMPONENTS OR MODIFY EXISTING SYSTEMS TO ACCOMMODATE NEW FLASHING, ETC. ALL SYSTEMS REMOVED AND REINSTALLED ARE TO BE OPERATIONAL AT THE CONCLUSION OF THE PROJECT.
28. LOOSE CABLES TO BE FASTENED TO PARAPET WALLS, ABANDONED CABLES TO BE REMOVED PENDING BCPSS APPROVAL.
29. CEILINGS IN SPACES AFFECTED BY ROOF DRAIN AND PIPING REMOVAL TO BE REPLACED/REPAIRED.
30. WALK PADS SHALL BE INSTALLED ON THE NEW ROOF SURFACE BETWEEN THE ROOF HATCHES AND ALL SERVICABLE EQUIPMENT.
31. ALL NEW EQUIPMENT SHALL BE CENTERED ON ITS CURB.
32. AT ALL COPING CORNERS, USE A PRE-MANUFACTURED COPING CORNER.
33. CLEAN ANY BRICK EXPOSED BY THE WORK PRIOR TO INSTALLING NEW FLASHING.
34. SLOPE COPING TO ROOF

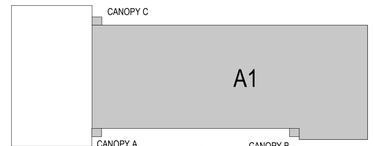


A1 A-101 NEW WORK ROOF PLAN AREA A1

1/8" = 1'-0" (0, 4', 8', 16')

THIS SHEET IS 30" X 42" AT FULL SIZE.

KEY PLAN



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301-203-1784

REVISIONS		
DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/08/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · SUSAN A. DEMARCO · 18339 · ARCHITECT

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Architect under the laws of the state of Maryland. License No. 18339, Expiration Date 12/09/2025.

SHEET TITLE
NEW WORK ROOF PLAN AREA A1

DRAWN BY	CHECKED BY
SD	SD

SET DESCRIPTION: 100% CONSTRUCTION DOCUMENTS
DATE: 12/29/2023

SHEET NO
A-101

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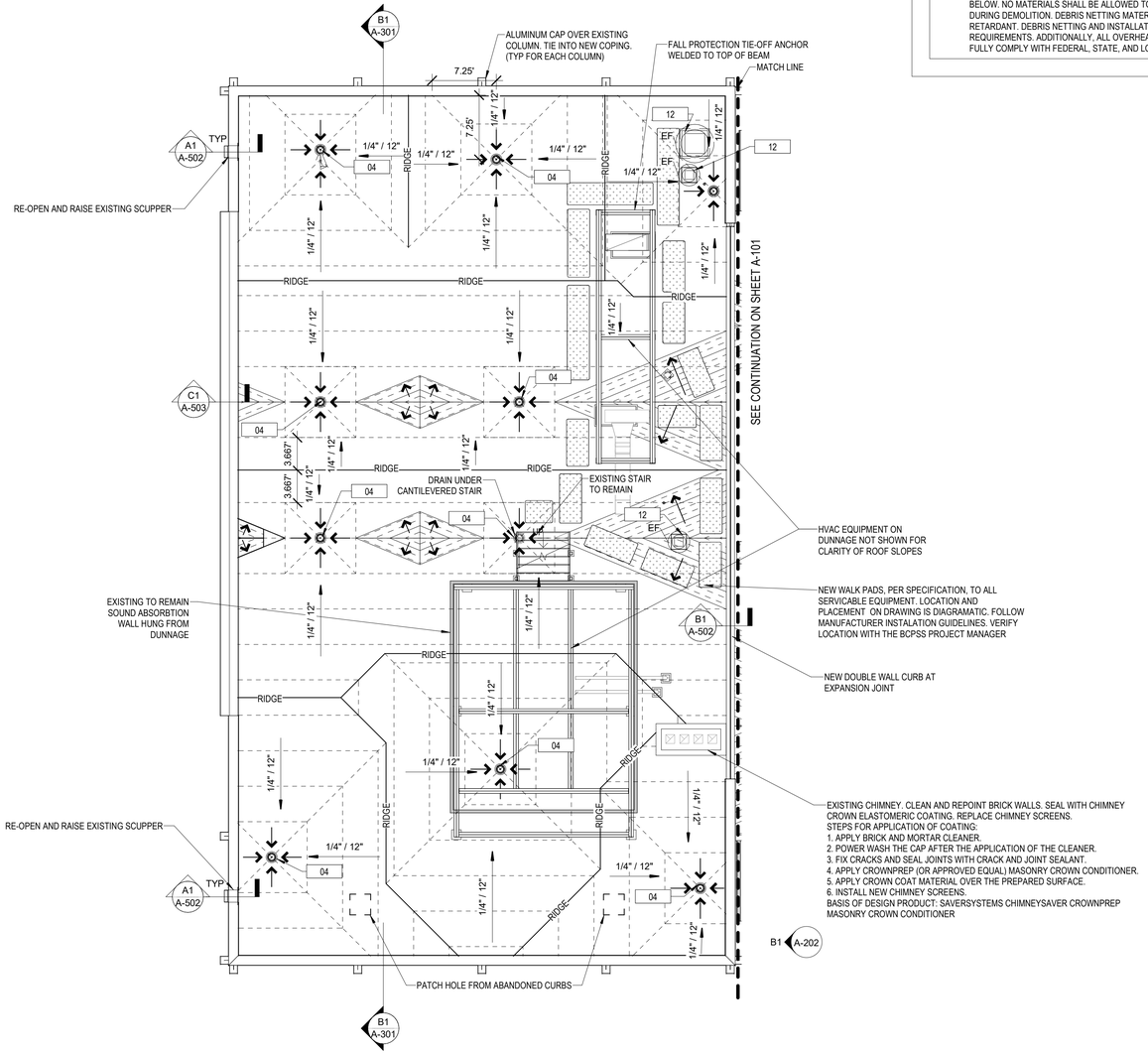

A1 A-102 NEW WORK ROOF PLAN AREA A2

1/8" = 1'-0" 0 4' 8' 16'

GENERAL NOTES

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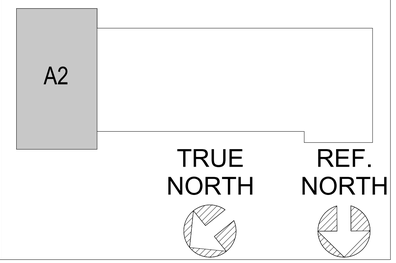
34. SLOPE COPING TO ROOF

KEY PLAN



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301-203-1784

REVISIONS		
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12/08/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · SUSAN K. KERSCH · 18330 · ARCHITECT

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License No. 18330, Expiration Date 12/09/2025

SHEET TITLE
NEW WORK ROOF PLAN AREA A2

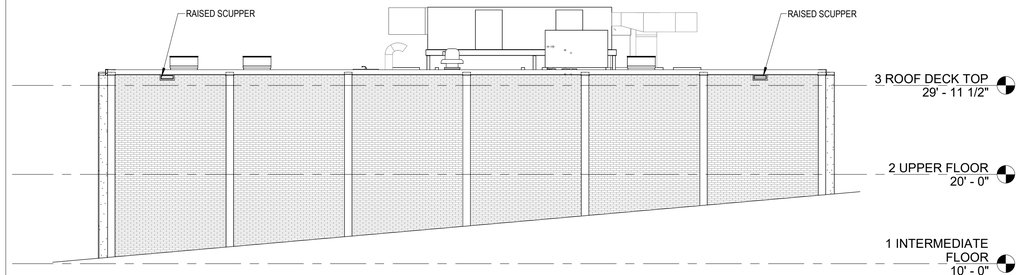
DRAWN BY	CHECKED BY
SD	SD

SET DESCRIPTION
100% CONSTRUCTION DOCUMENTS

DATE
12/29/2023

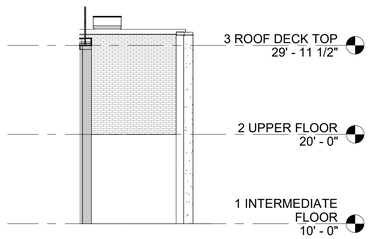
SHEET NO
A-102

STAPLE EDGE



C1 A-201 WEST ELEVATION AREA A1

1/8" = 1'-0" 0 4' 8' 16'

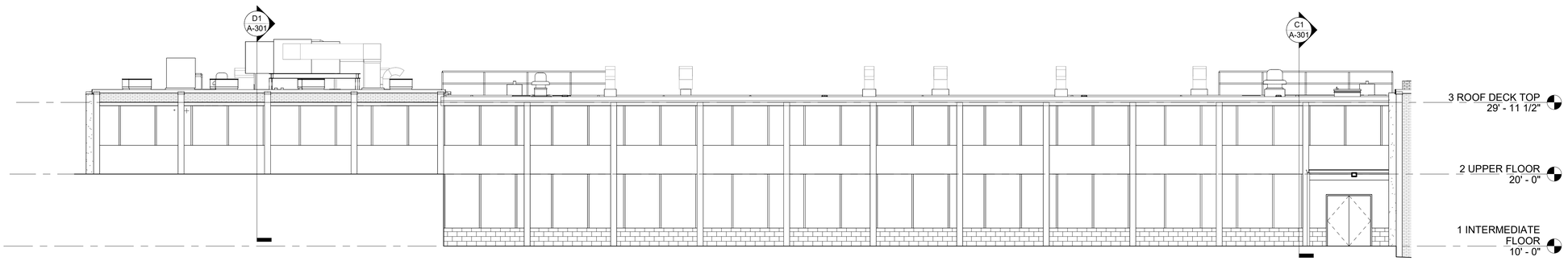


C3 A-201 AREA A1 EAST ELEVATION

1/8" = 1'-0" 0 4' 8' 16'

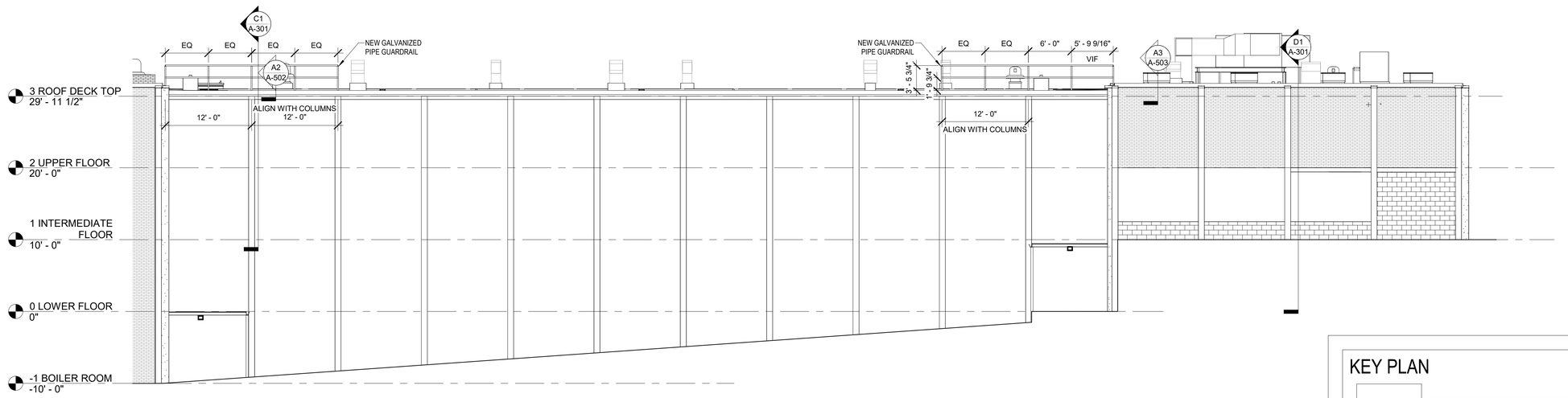
GENERAL NOTES

1. BUILDING ELEVATIONS ARE FOR GENERAL REFERENCE PURPOSES ONLY.



B1 A-201 SOUTH ELEVATION AREA A1

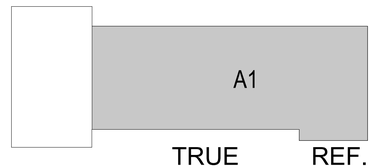
1/8" = 1'-0" 0 4' 8' 16'



A1 A-201 NORTH ELEVATION AREA A1

1/8" = 1'-0" 0 4' 8' 16'

KEY PLAN



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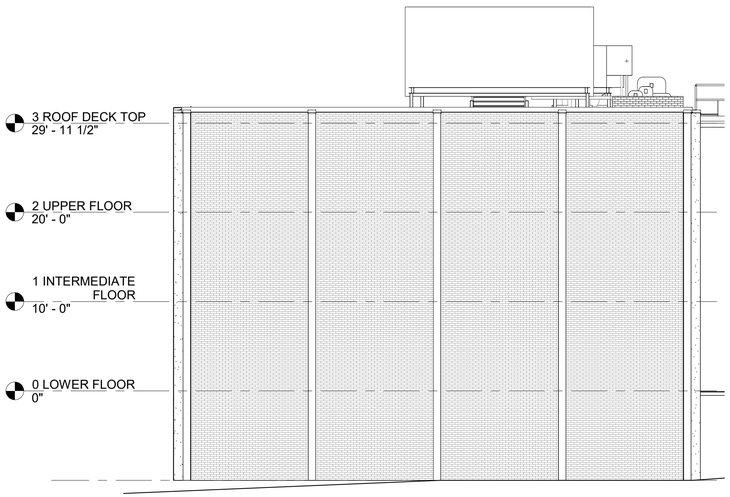
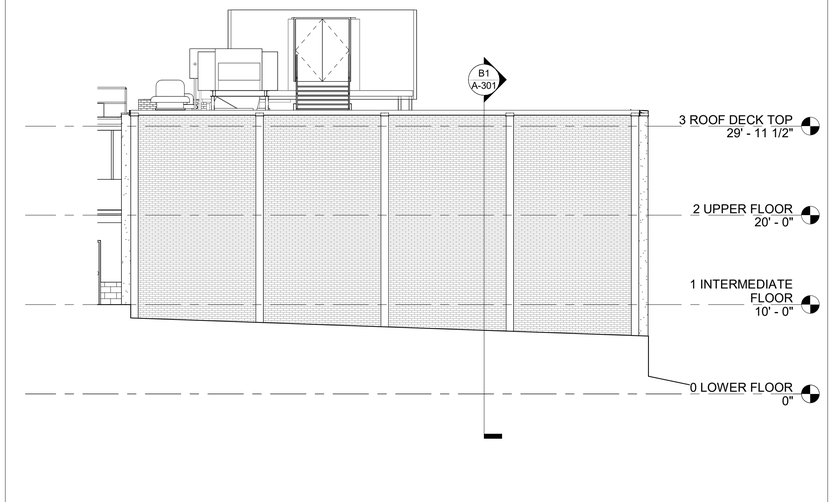


C1 A-202 NORTH ELEVATION AREA A2

1/8" = 1'-0" 0 4' 8' 16'



C2 A-202 SOUTH ELEVATION AREA A2

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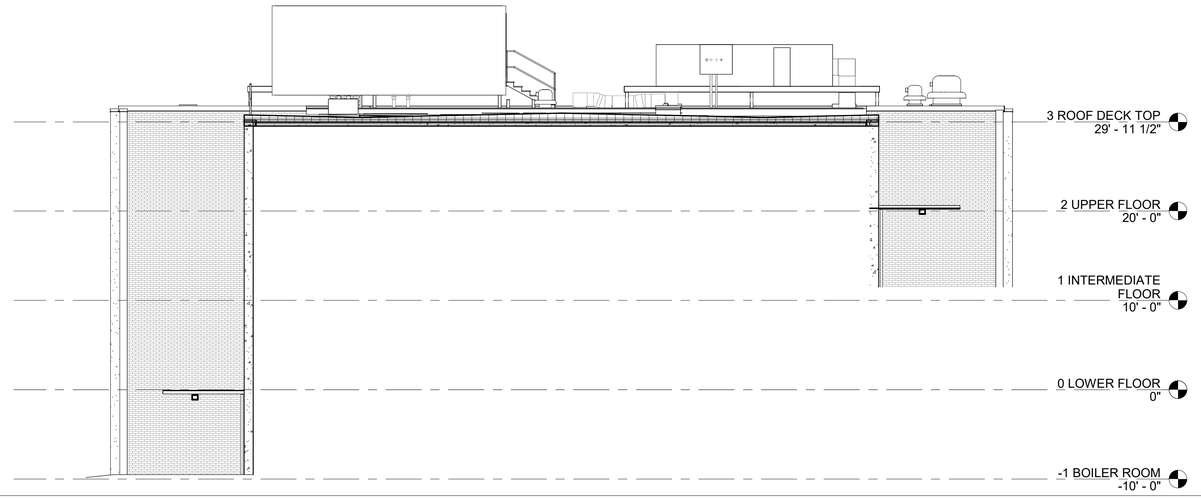
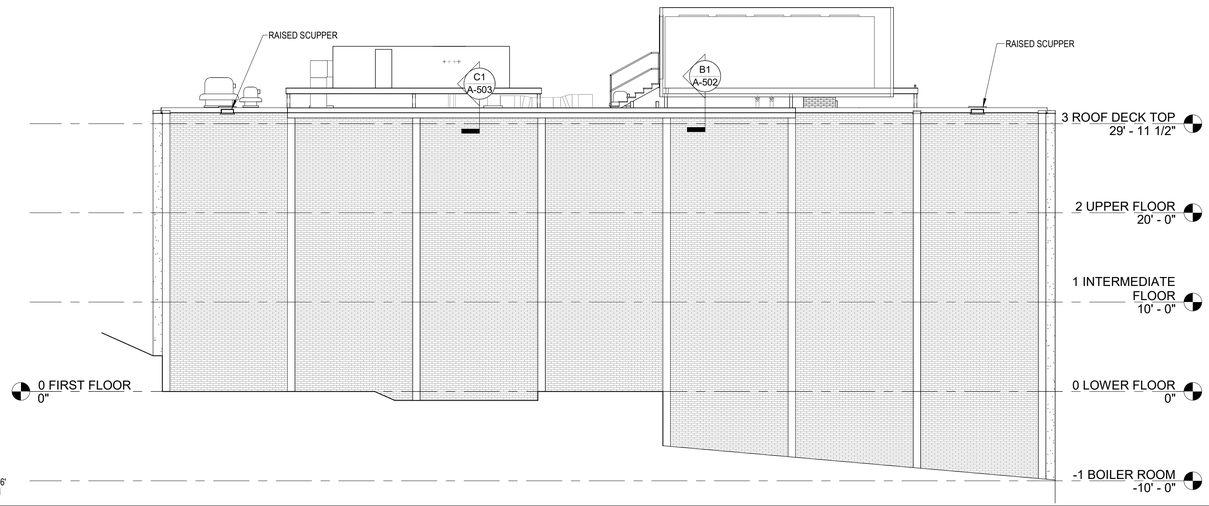


B1 A-202 AREA A2 - WEST ELEVATION

1/8" = 1'-0" 0 4' 8' 16'



A1 A-202 EAST ELEVATION AREA A2

1/8" = 1'-0" 0 4' 8' 16'

GENERAL NOTES

1. BUILDING ELEVATIONS ARE FOR GENERAL REFERENCE PURPOSES ONLY.

KEY PLAN

MICHAEL GRAVES

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STRUCTURAL ENGINEER
LEUTERIO THOMAS, LLC
6710 OXON HILL RD., SUITE 300
NATIONAL HARBOR, MD 20745
301-203-1784

REVISIONS		
DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/08/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · CHRISTINA KERNIGAN · 18330 · ARCHITECT

PROFESSIONAL CERTIFICATION
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License No. 18330, Expiration Date 12/09/2025

SHEET TITLE
BUILDING ELEVATIONS AREA A2

DRAWN BY	CHECKED BY
JB	SD

SET DESCRIPTION
100% CONSTRUCTION DOCUMENTS

DATE
12/29/2023

SHEET NO
A-202

STAPLE EDGE

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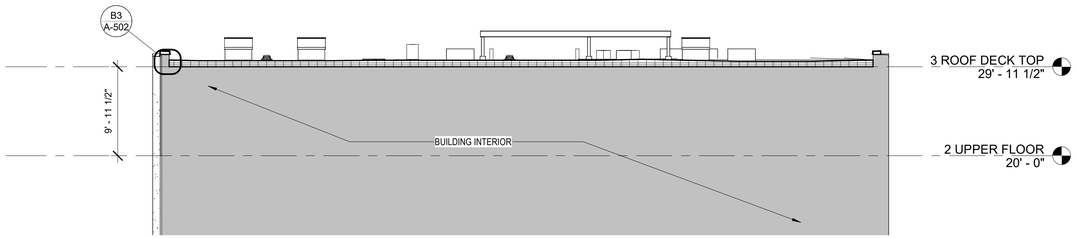
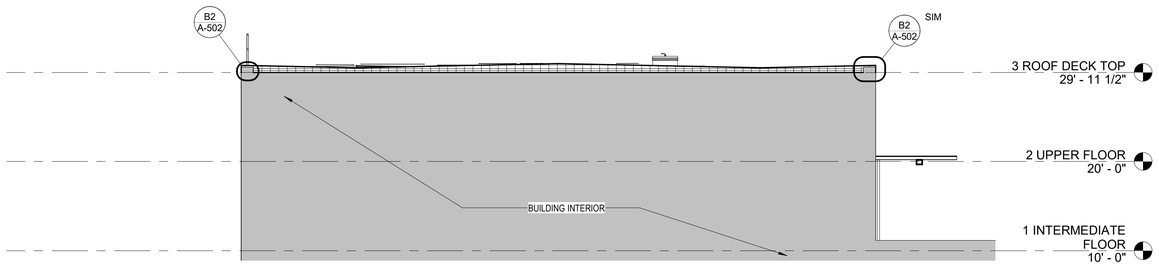


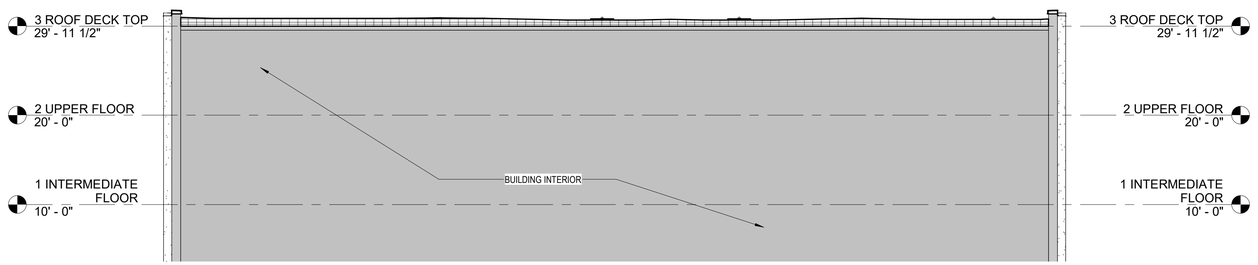
D1 / A-301 BUILDING SECTION - A1 SHORT SOUTH

1/8" = 1'-0" (0, 4', 8', 16')



C1 / A-301 BUILDING SECTION - A1 SHORT MIDDLE

1/8" = 1'-0" (0, 4', 8', 16')



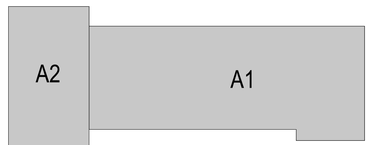
B1 / A-301 BUILDING SECTION - A2 SHORT

1/8" = 1'-0" (0, 4', 8', 16')

GENERAL NOTES

1. BUILDING SECTIONS ARE FOR GENERAL REFERENCE PURPOSES ONLY. NOT ALL ITEMS IN SCOPE HAVE BEEN TAGGED.

KEY PLAN



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STATE OF MARYLAND · SHASTA KERSHNER · 18330 · REGISTERED ARCHITECT

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SHEET TITLE
BUILDING SECTIONS

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SD	SD	A-301

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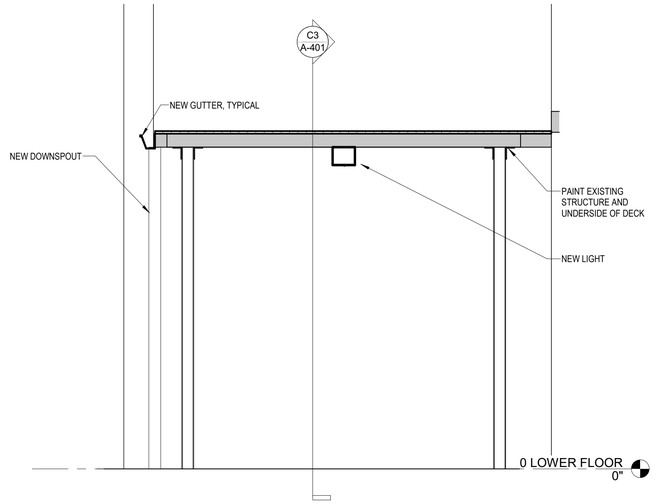
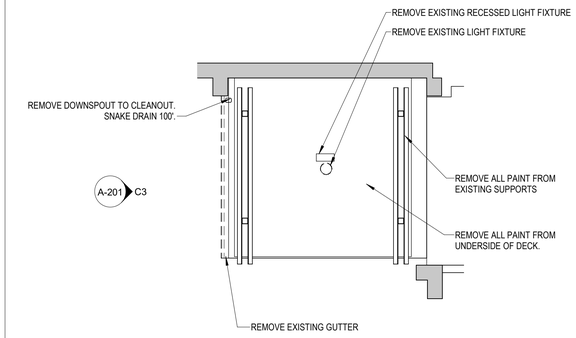
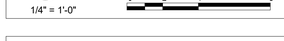
NEW WORK KEYNOTE LEGEND	
KEYNOTE NUMBER	KEYNOTE TEXT
69	NEW GUTTER AND DOWNSPOUT, TYPICAL.

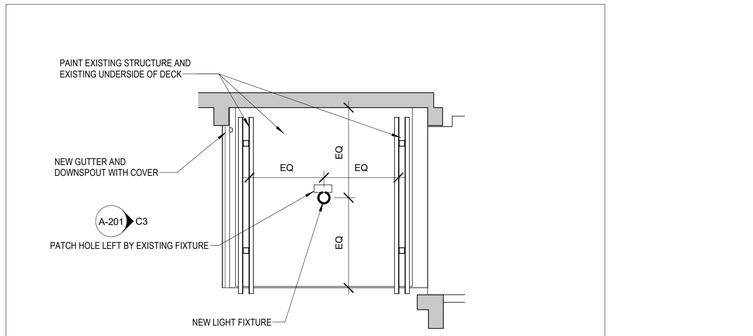


C1 A-401 TYPICAL CANOPY SECTION WIDTH
1/2" = 1'-0"

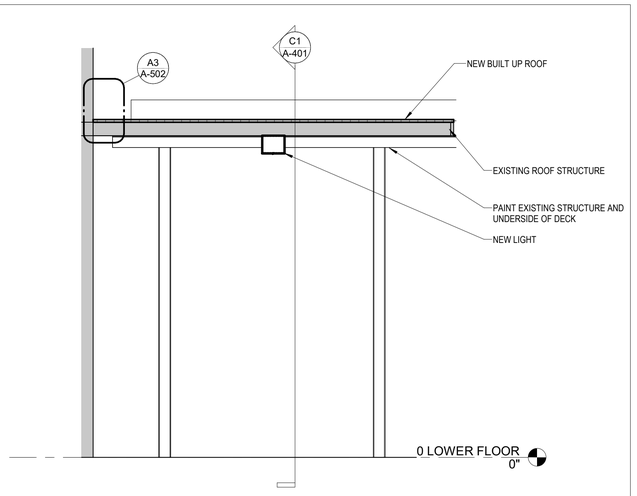


C4 A-401 TYPICAL DEMOLITION CANOPY REFLECTED CEILING PLAN
1/4" = 1'-0"

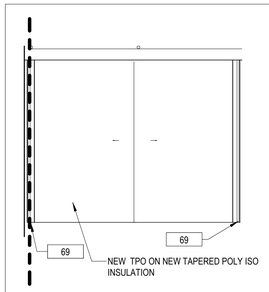




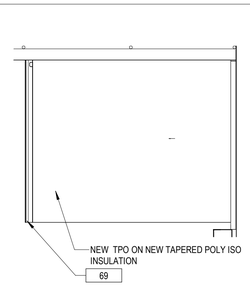
D4 A-401 TYPICAL CANOPY REFLECTED CEILING PLAN
1/4" = 1'-0"



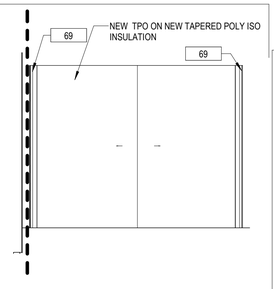
C3 A-401 TYPICAL CANOPY SECTION DEPTH
1/2" = 1'-0"



A3 A-401 CANOPY A PLAN
1/4" = 1'-0"

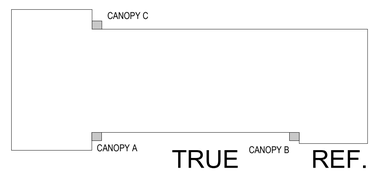


A4 A-401 CANOPY B PLAN
1/4" = 1'-0"



A5 A-401 CANOPY C PLAN
1/4" = 1'-0"

KEY PLAN



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SHEET TITLE
CANOPY PLANS AND SECTIONS

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SD	SD

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SHEET NO
A-401

STAPLE EDGE

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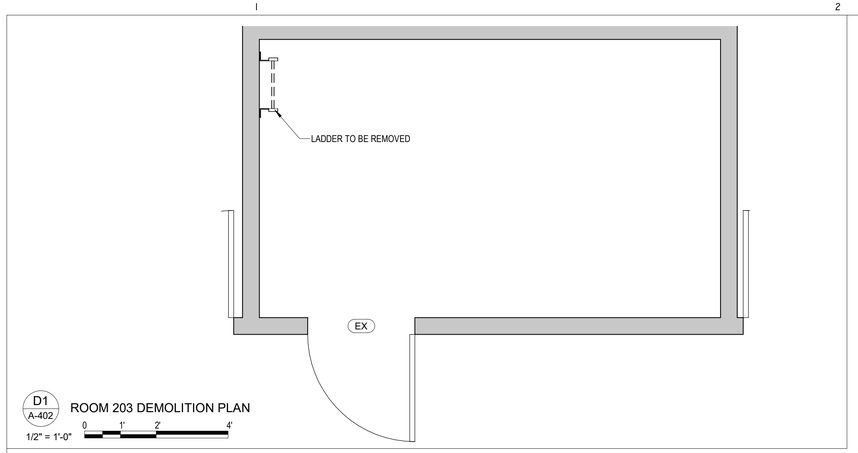
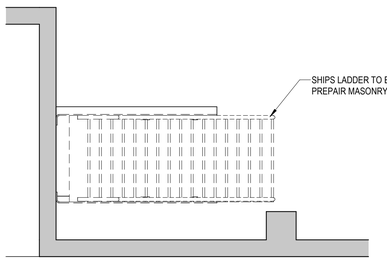
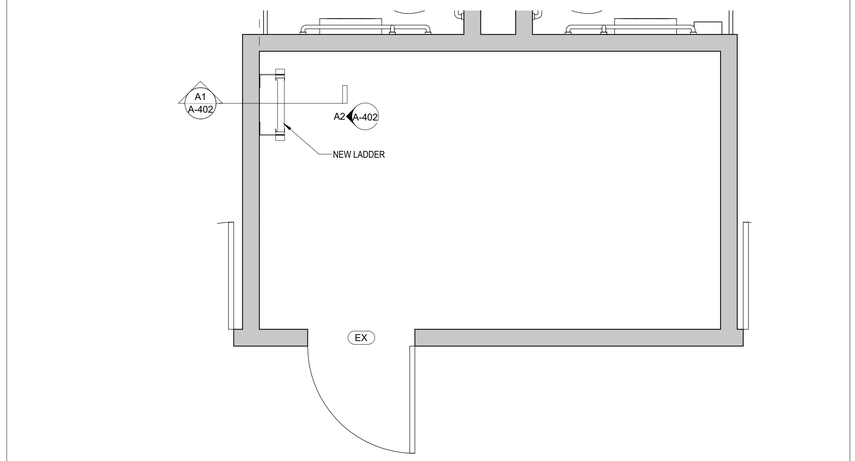


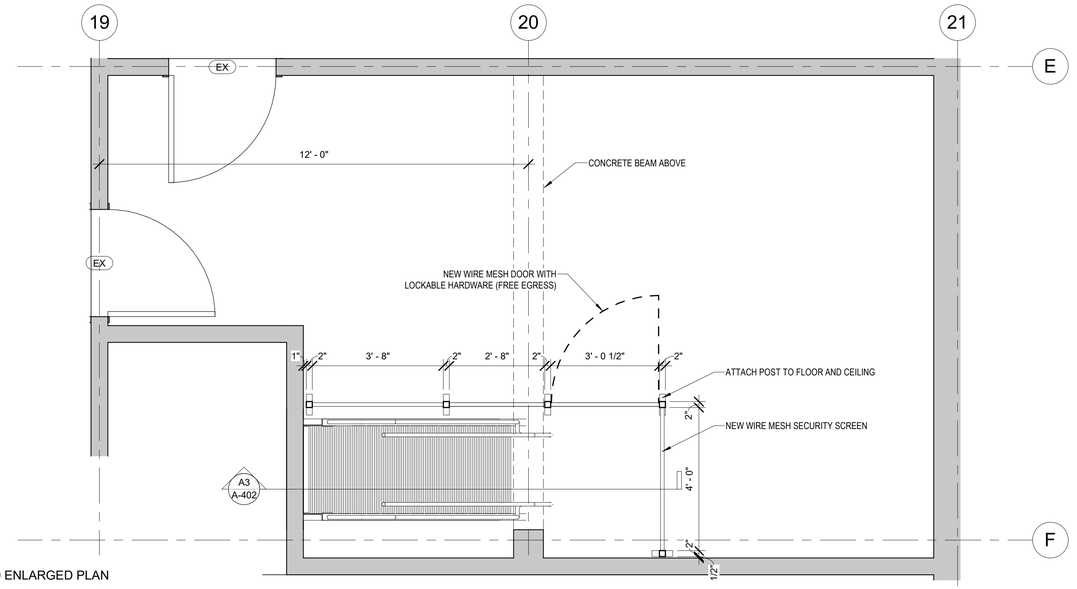
D1 A-402 ROOM 203 DEMOLITION PLAN
1/2" = 1'-0"



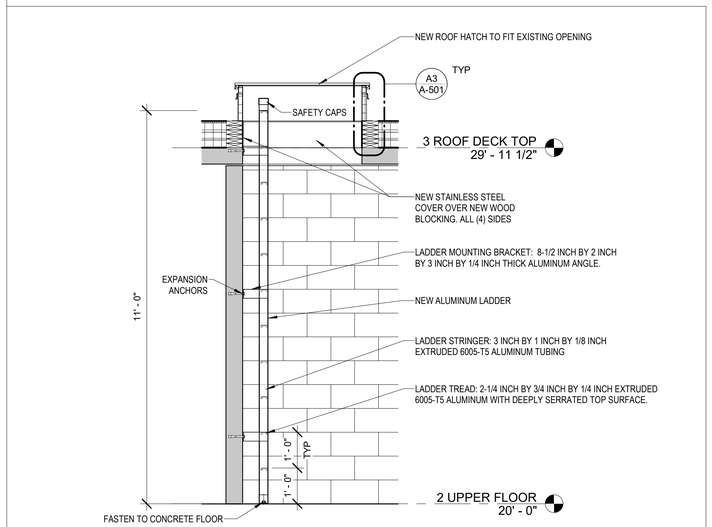
D2 A-402 ROOM 209 DEMOLITION PLAN
1/2" = 1'-0"



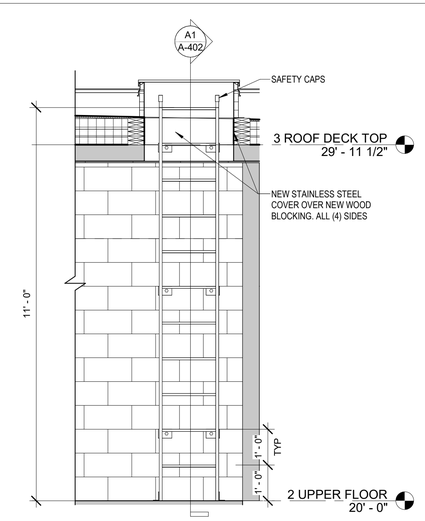
B1 A-402 ROOM 203 ENLARGED PLAN
1/2" = 1'-0"



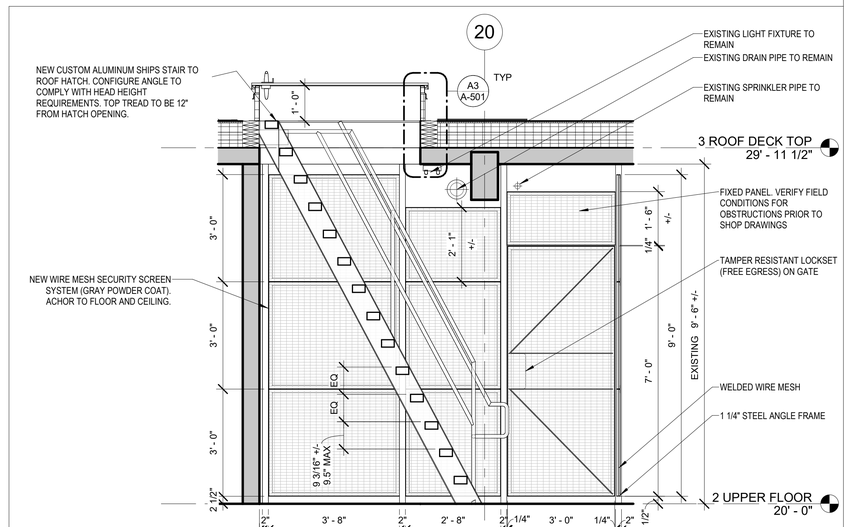
B2 A-402 ROOM 209 ENLARGED PLAN
1/2" = 1'-0"



A1 A-402 ROOF LADDER SECTION
1/2" = 1'-0"



A2 A-402 ROOF ACCESS LADDER ELEVATION
1/2" = 1'-0"



A3 A-402 STAIR SECTION
1/2" = 1'-0"

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SHEET TITLE
ROOF ACCESS PLANS AND SECTIONS

DRAWN BY	CHECKED BY	SHEET NO
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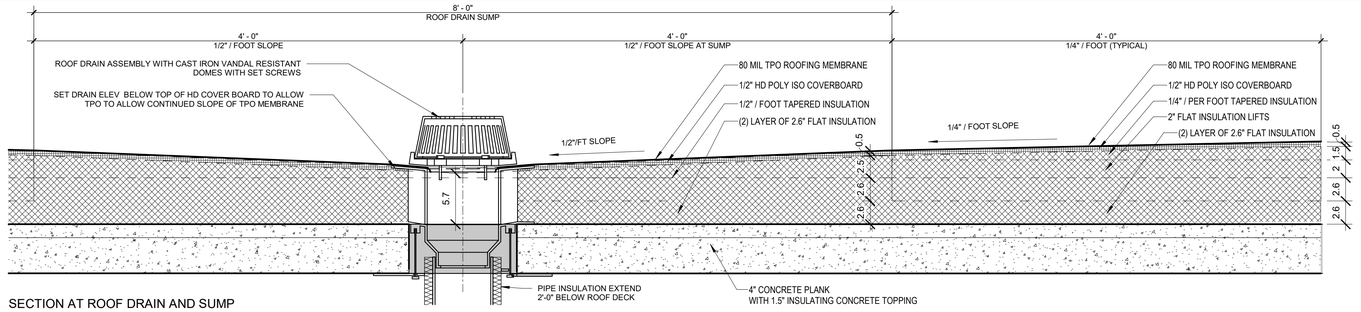
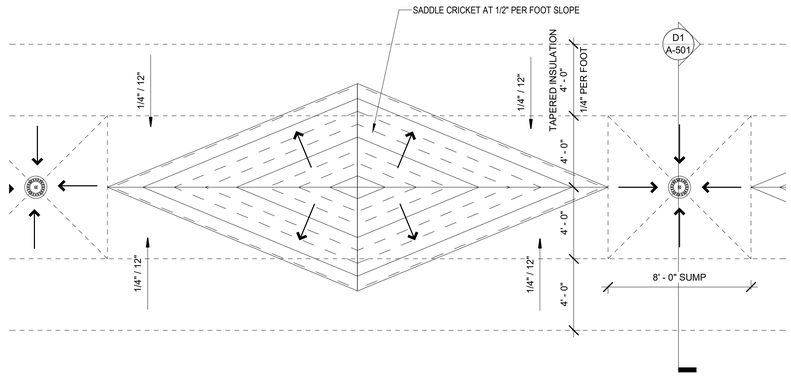


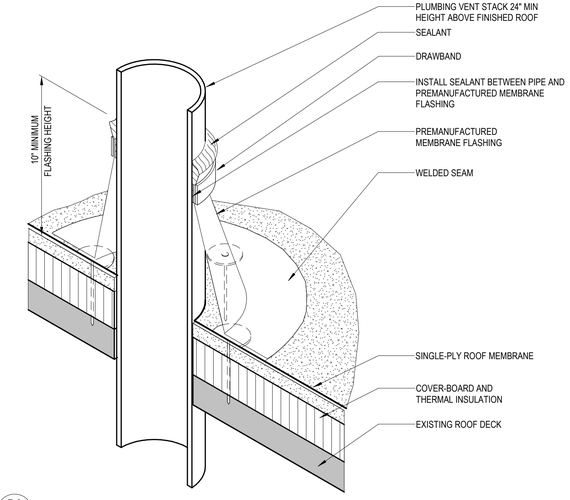
D1 / A-501 SECTION AT ROOF DRAIN AND SUMP

1 1/2" = 1'-0" (0, 1/2", 1', 2')



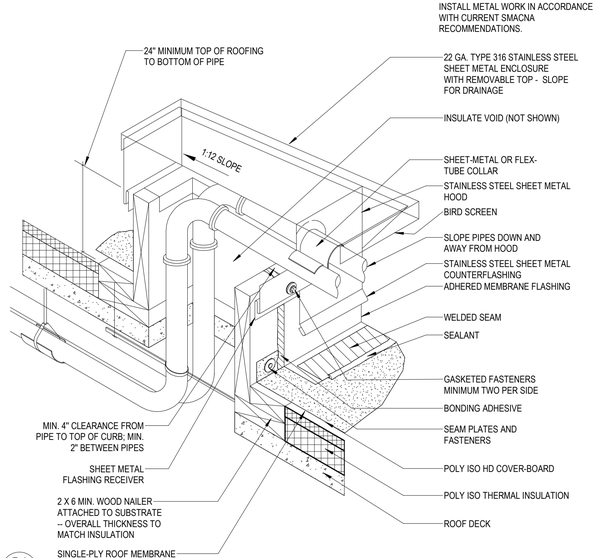
C1 / A-501 PLAN DETAIL - ROOF SADDLE AND DRAIN SUMP

1/4" = 1'-0" (0, 2', 4', 8')



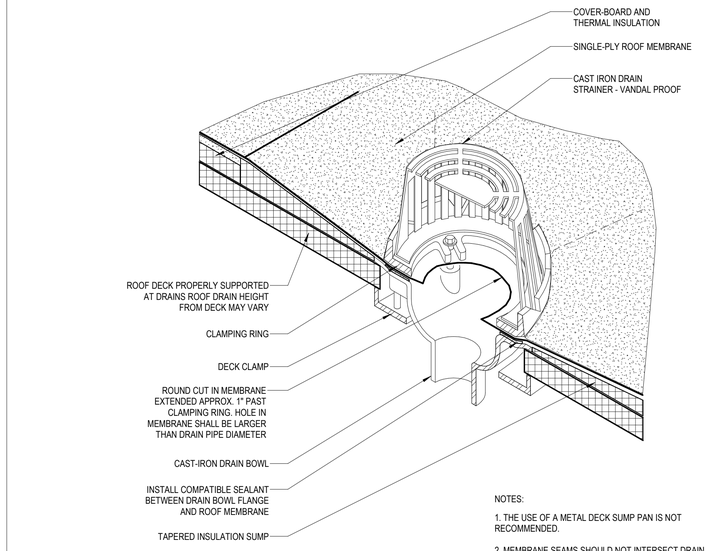
B3 / A-501 PIPE PENETRATION

NTS



B4 / A-501 MULTI-PIPE PENETRATION - TPO

NTS



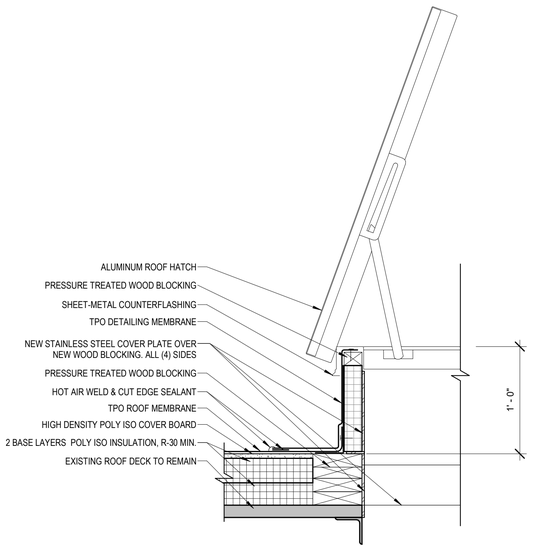
NOTES:

1. THE USE OF A METAL DECK SUMP PAN IS NOT RECOMMENDED.

2. MEMBRANE SEAMS SHOULD NOT INTERSECT DRAIN CLAMPING RING. SEAMS THAT FALL WITHIN DRAIN SUMP SHOULD BE STRIPPED IN.

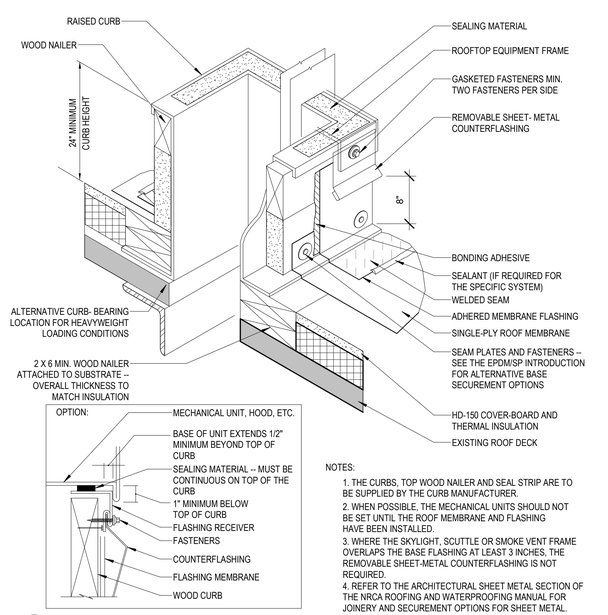
A2 / A-501 ROOF DRAIN

1" = 1'-0" (0, 1/2", 1', 2')



A3 / A-501 ROOF HATCH CURB FLASHING DETAIL

1 1/2" = 1'-0" (0, 1', 2')



NOTES:

1. THE CURBS, TOP WOOD NAILER AND SEAL STRIP ARE TO BE SUPPLIED BY THE CURB MANUFACTURER.
2. WHEN POSSIBLE, THE MECHANICAL UNITS SHOULD NOT BE SET UNTIL THE ROOF MEMBRANE AND FLASHING HAVE BEEN INSTALLED.
3. WHERE THE SKYLIGHT, SCUTTLE OR SMOKE VENT FRAME OVERLAPS THE BASE FLASHING AT LEAST 3 INCHES, THE REMOVABLE SHEET-METAL COUNTERFLASHING IS NOT REQUIRED.
4. REFER TO THE ARCHITECTURAL SHEET METAL SECTION OF THE NRCA ROOFING AND WATERPROOFING MANUAL FOR JOINERY AND SECUREMENT OPTIONS FOR SHEET METAL.
5. ALL REPLACED RTU'S SHALL BE INSTALLED ON CURBS AND PROVIDED SUITABLE VIBRATION INSULATION DEVICES AND PROPER FLASHING

A4 / A-501 ROOF CURB

NTS

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DETAILS

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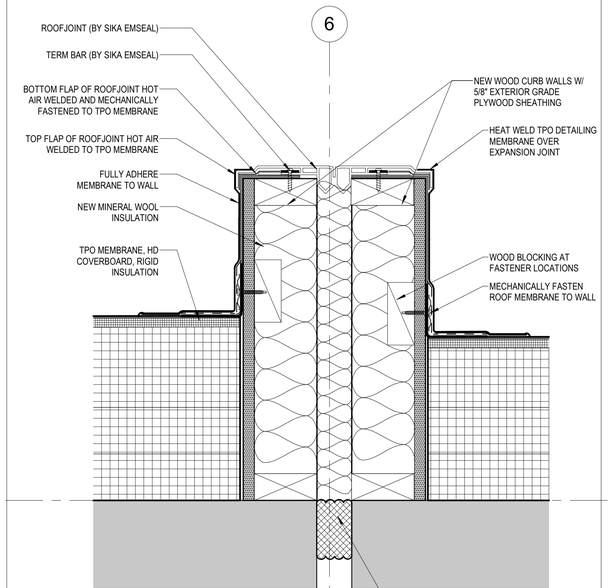
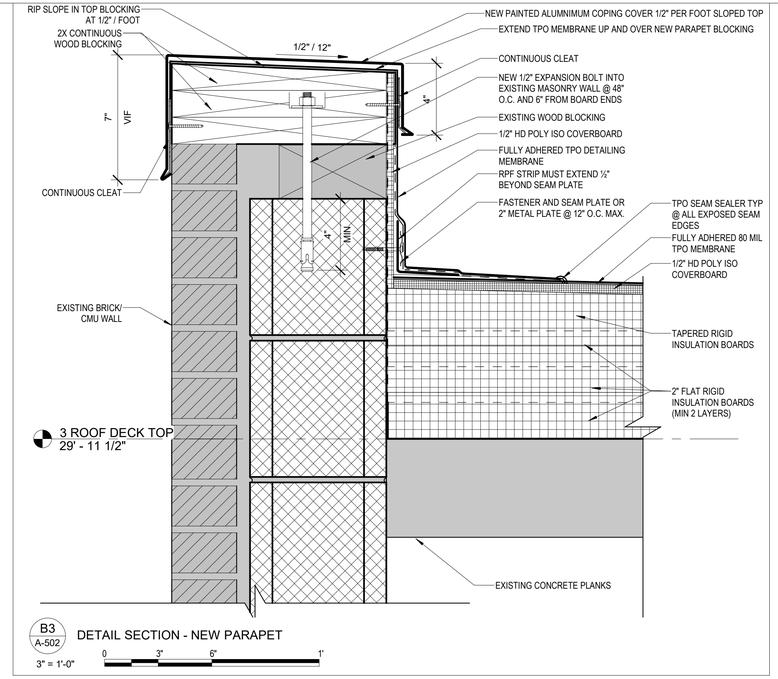


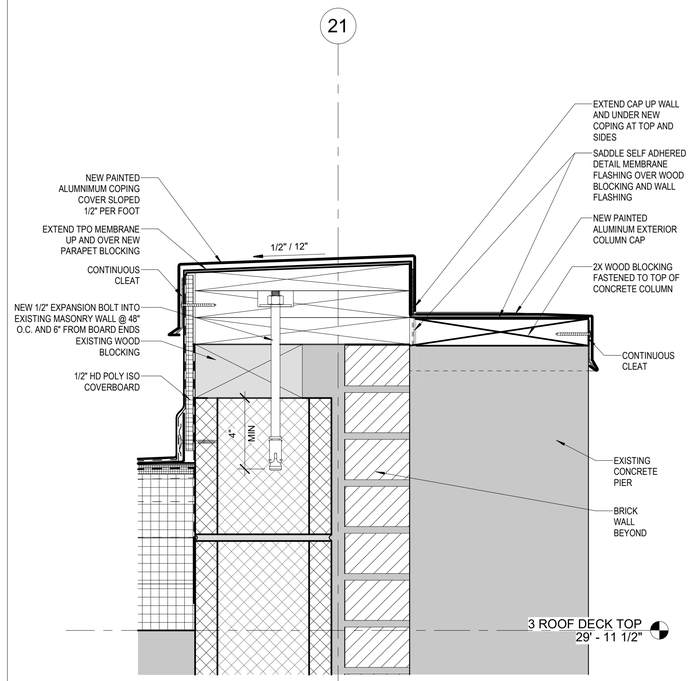
B1 A-502 EXPANSION JOINT DETAIL

3" = 1'-0"



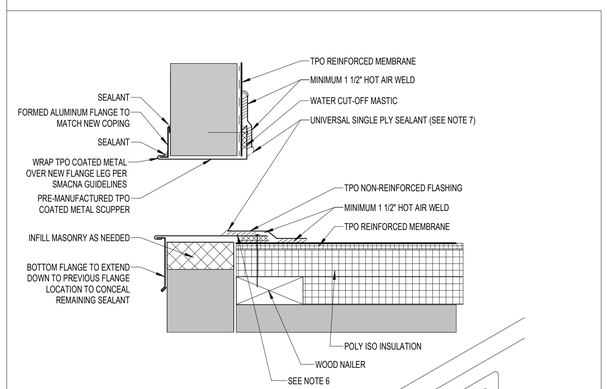
B3 A-502 DETAIL SECTION - NEW PARAPET

3" = 1'-0"



B4 A-502 SECTION AT EXTERIOR CONCRETE COLUMN

3" = 1'-0"

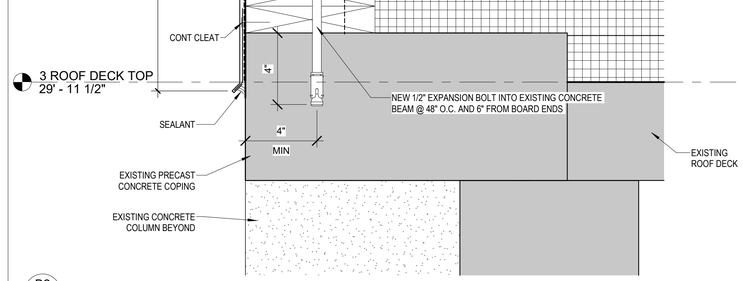


NOTES:

1. WOOD NAILER MUST EXTEND PAST TOTAL WIDTH OF DECK FLANGE.
2. INSTALL WALL FLASHING PRIOR TO SCUPPER INSTALLATION.
3. DISCONTINUE FASTENING PLATES AT SCUPPER OPENING AS SHOWN.
4. METAL SCUPPER BOX MUST HAVE CONTINUOUS SIDES; METAL FLANGE MUST BE CONTINUOUS WITH ROUNDED CORNERS.
5. WATER CUT-OFF MASTIC UNDER SCUPPER FLANGE MUST BE UNDER CONSTANT COMPRESSION.
6. MINIMUM 1 1/2" HOT AIR WELD FROM NAIL HEAD.
7. MANUFACTURERS UNIVERSAL SINGLE PLY SEALANT IS REQUIRED AT FLASHING EDGE ON SCUPPER EDGE. TAPE PRIMER MUST BE USED TO PREPAREARE SURFACES PRIOR TO APPLYING UNIVERSAL SINGLE PLY SEALANT.

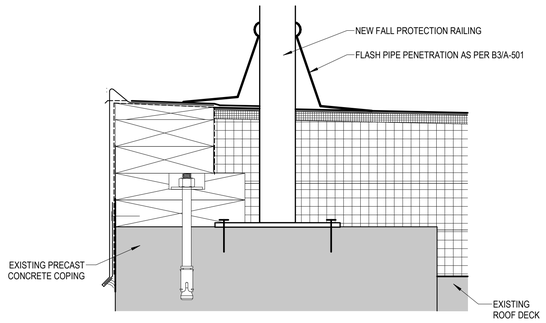
A1 A-502 ROOF THROUGH-WALL SCUPPER-TPO COATED METAL

12" = 1'-0"



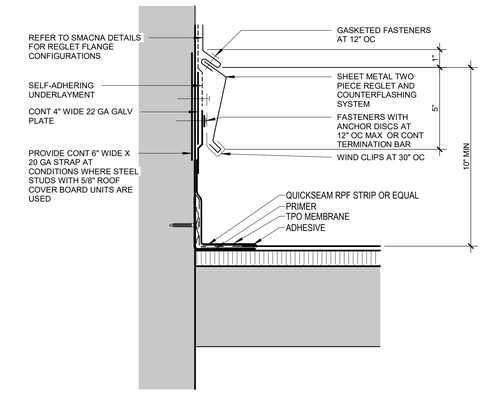
B2 A-502 DETAIL SECTION - GRAVEL STOP EDGE

3" = 1'-0"



A2 A-502 FALL PROTECTION DETAIL

3" = 1'-0"



A3 A-502 CANOPY CONNECTION AT WALL

3" = 1'-0"

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LEUTERIO THOMAS, LLC
6710 OXON HILL RD., SUITE 300
NATIONAL HARBOR, MD 20745
301-203-1784

REVISIONS		
DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/08/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

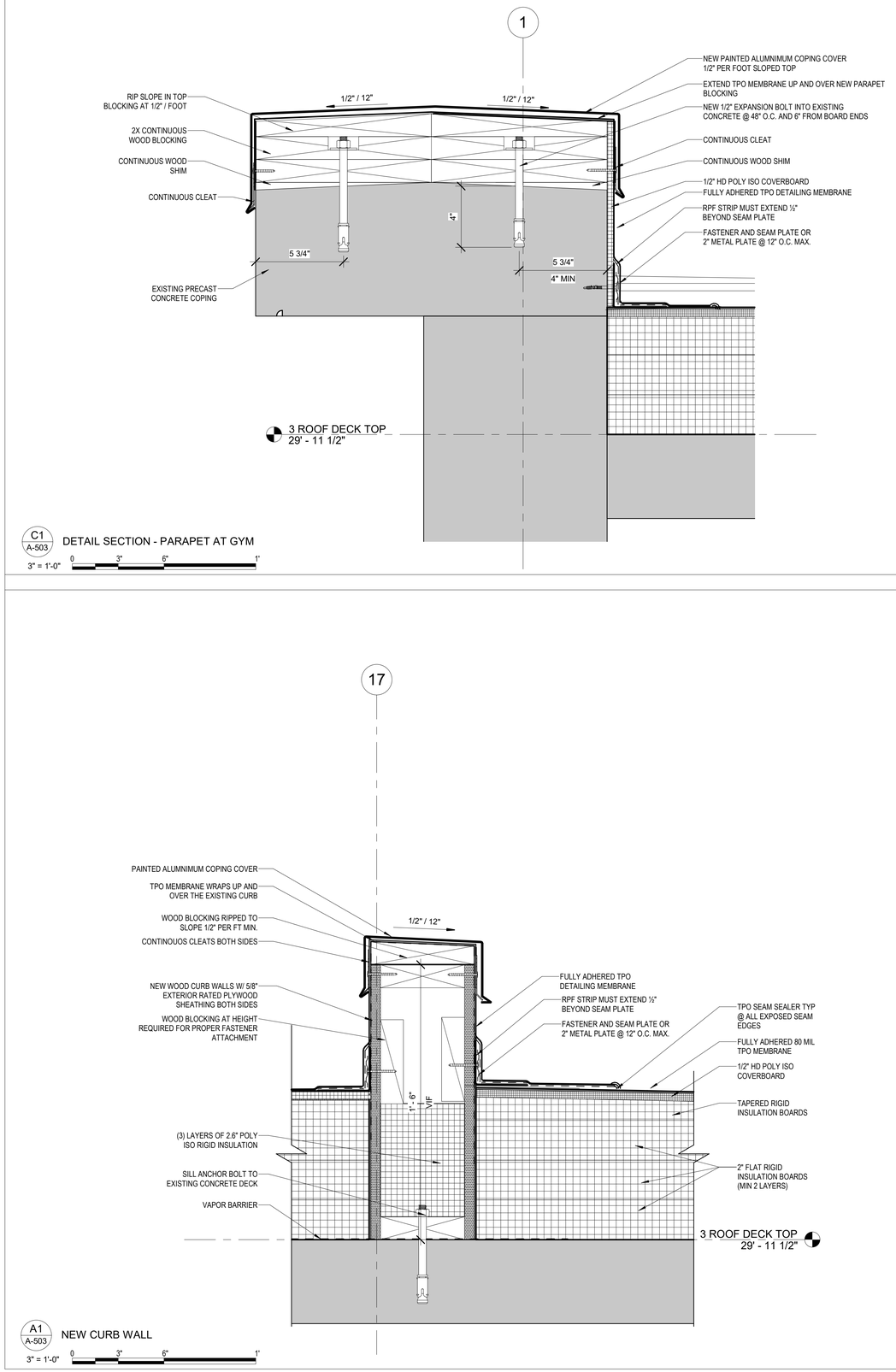
PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Architect under the laws of the state of Maryland.
License No. 18330, Expiration Date 12/09/2025

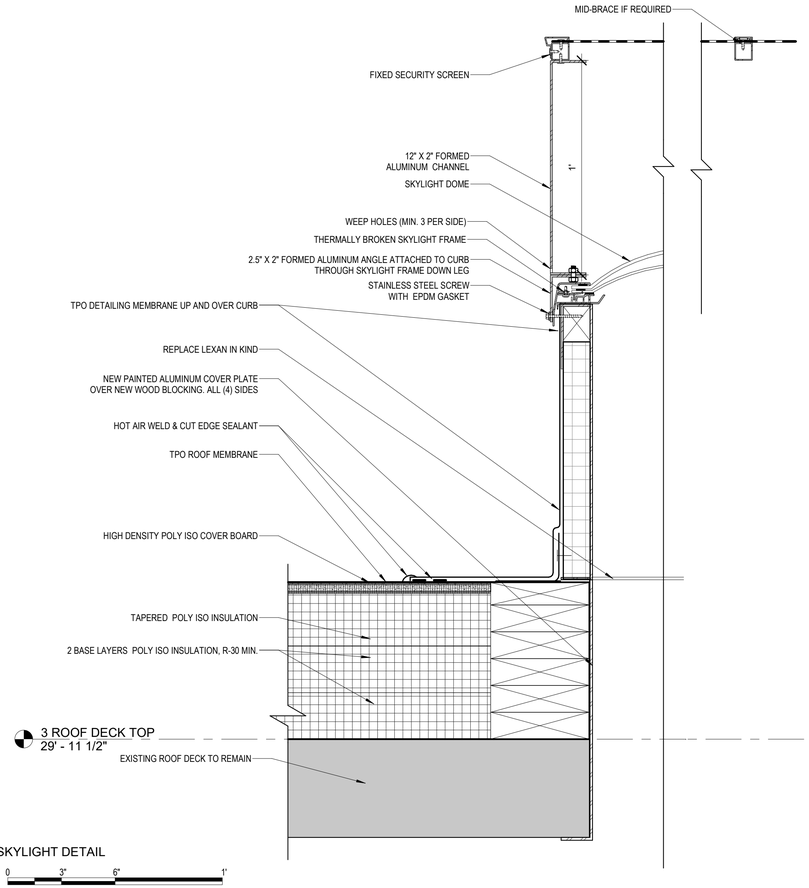
SHEET TITLE
DETAILS

DRAWN BY	CHECKED BY	SHEET NO
SD	SD	A-502

SET DESCRIPTION
100% CONSTRUCTION DOCUMENTS

DATE
12/29/2023





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PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · VIRGINIA KERRIGAN · 18330 · ARCHITECT

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Architect under the laws of the state of Maryland.
License No. 18330, Expiration Date 12/09/2025

SHEET TITLE
DETAILS

DRAWN BY	CHECKED BY	SHEET NO
SD	SD	A-503

SET DESCRIPTION
100% CONSTRUCTION DOCUMENTS

DATE
12/29/2023

STAPLE EDGE

1/25/2024 12:12:35 AM C:\Temp\BCPS Mt Washington 221 Roof_r23_abennettT72RP.rvt

THIS SHEET IS 30" X 42" AT FULL SIZE.

STAPLE EDGE

GENERAL NOTES:

1. ALL DETAILS, SECTIONS, AND NOTES SHOWN ON THE DRAWINGS ARE INTENDED TO BE TYPICAL AND SHALL APPLY TO SIMILAR SITUATIONS, UNO.
2. NO CHANGE IN SIZE, DIMENSION OR POSITION OF STRUCTURAL ELEMENTS SHALL BE MADE WITHOUT THE APPROVAL OF THE STRUCTURAL ENGINEER OF RECORD.
3. FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS BEFORE STARTING CONSTRUCTION AND/OR SUBMITTING SHOP DRAWINGS. ANY DISCREPANCIES SHALL BE REPORTED TO THE STRUCTURAL ENGINEER OF RECORD.
4. REFER TO ARCHITECTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS FOR DIMENSIONS AND LOCATIONS OF OPENINGS, INSERTS, DEPRESSIONS, EQUIPMENT PADS, DRIPS, REVEALS, FINISHES, AND OTHER SUCH PROJECT REQUIREMENTS NOT SHOWN ON STRUCTURAL DRAWINGS.
5. SUBMIT DIMENSIONED COORDINATED SHOP DRAWINGS SHOWING THE LOCATIONS OF ALL SLEEVES AND OPENINGS REQUIRED BY ALL TRADES THROUGH STRUCTURAL ELEMENTS. ANY ADDITIONAL OPENINGS NOT SHOWN ON SHOP DRAWINGS WILL REQUIRE WRITTEN APPROVAL OF THE STRUCTURAL ENGINEER OF RECORD.
6. TAKE ALL MEASURES NECESSARY TO PROTECT EXISTING AND NEW UTILITIES, STRUCTURAL MEMBERS, FINISHES, ETC. ASSUME FULL RESPONSIBILITY FOR ANY DAMAGE DURING CONSTRUCTION. RESTORATION OF DAMAGED AREAS SHALL BE TO THE SATISFACTION OF THE OWNER, AT NO COST TO THE OWNER.
7. REFER TO ARCHITECTURAL DRAWINGS FOR DETAILED INFORMATION REGARDING FINISHES, WATERPROOFING, LOCATIONS OF NON-LOAD BEARING PARTITIONS, EXTERIOR FACE OF BUILDING, ETC.
8. DO NOT REPRODUCE ANY PORTION OF THE STRUCTURAL CONTRACT DRAWINGS FOR RESUBMITTAL AS SHOP DRAWINGS. SHOP DRAWINGS PRODUCED IN SUCH A MANNER WILL BE REJECTED AND RETURNED.
9. IF A CONFLICT EXISTS BETWEEN THE DRAWINGS AND SPECIFICATIONS, THE STRICTEST PROVISION SHALL GOVERN, THE ENGINEER OF RECORD SHALL BE NOTIFIED OF ANY AND ALL CONFLICTS PRIOR TO CONSTRUCTION.

CODES & STANDARDS:

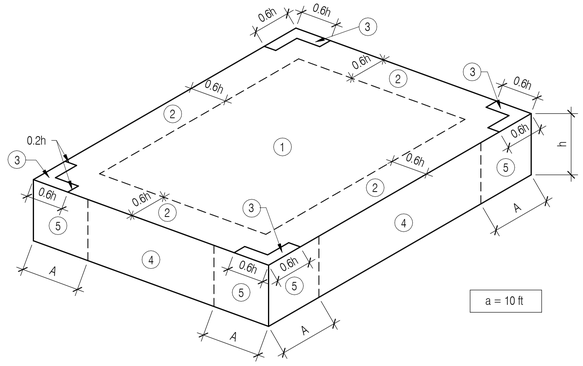
1. THE FOLLOWING CODES AND STANDARDS, INCLUDING ALL SPECIFICATIONS REFERENCED WITHIN, APPLY TO THE DESIGN AND CONSTRUCTION OF THIS PROJECT:
   a. ICC, INTERNATIONAL BUILDING CODE - 2018
   b. ASCE 7-16, MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES
   c. ACI 318-14, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
   d. AISC 306-16, SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS

DESIGN LOADS:

1. SUPERIMPOSED DEAD LOADS
   a. ROOFING & INSULATION 3 PSF
   b. EXISTING INSULATING CONCRETE 12 PSF
   c. COLLATERAL (MEP) 5 PSF
2. LIVE LOADS
   a. ROOF 30 PSF (PER CITY)
3. SNOW LOADS
   a. GROUND SNOW LOAD, Pg 30 PSF
   b. IMPORTANCE FACTOR, Is 1.10
   c. EXPOSURE FACTOR, Ce 0.90
   d. THERMAL FACTOR, Ct 1.00
   e. FLAT ROOF SNOW LOAD, Pf 21 PSF
   f. MINIMUM DESIGN LOAD 30 PSF
   g. WHERE APPLICABLE, DRIFTING SNOW IS IN ADDITION TO THE LOAD SHOWN. SNOW DRIFT LOADS SHALL BE CALCULATED PER ASCE 7-16.
4. WIND
   a. WIND SPEED 120 MPH
   b. BUILDING RISK CATEGORY III
   c. EXPOSURE B
   d. DIRECTIONALITY FACTOR, Kd 0.85
   e. TOPOGRAPHIC FACTOR, Kzt 1.00
   f. MAIN WIND-FORCE RESISITING SYSTEM DESIGN LOADS
      - MEAN ROOF HEIGHT 25 PSF
   g. BUILDING COMPONENTS & CLADDING DESIGN LOADS PER IBC 2018, SECTION 6.5.12.4. REFER TO TABLE BELOW.
5. SEISMIC
   a. BUILDING RISK CATEGORY III
   b. IMPORTANCE FACTOR, Ie 1.25
   c. SITE CLASS D (ASSUMED)
   d. MAPPED SPECTRAL ACCELARATION
      - SHORT PERIOD, Ss 0.144 g
      - 1-SECOND PERIOD, S1 0.043 g
   e. LONG-PERIOD TRANSITION PERIOD, T1 6 sec
   f. SEISMIC DESIGN CATEGORY B

COMPONENTS AND CLADDING SERVICE WIND LOADING (H<60'-0")						
ROOF SURFACE PRESSURE (PSF)						
ZONE	AREA < 10 FT²		AREA = 100 FT²		AREA > 500 FT²	
	+P	-P	+P	-P	+P	-P
1	16	45	16	35	16	28
1'	16	26	16	26	16	17
2	16	59	16	46	16	38
3	16	81	16	55	16	38
WALL SURFACE PRESSURE (PSF)						
ZONE	AREA < 10 FT²		AREA = 50 FT²		AREA > 500 FT²	
	+P	-P	+P	-P	+P	-P
4	26	28	23	25	19	21
5	26	34	23	29	19	21

NOTES:
- +P INDICATES THAT PRESSURE IS ACTING TOWARDS THE STRUCTURE
- -P INDICATES THAT PRESSURE IS ACTING AWAY THE STRUCTURE



EXISTING CONSTRUCTION:

1. ALL INFORMATION SHOWN ON THESE DRAWINGS THAT RELATE TO THE EXISTING CONSTRUCTION HAS BEEN BASED ON EXISTING DRAWINGS PREPARED BY:
   a. EWELL, NELSON & BOMHARDT, DATED JUNE 16, 1961
   b. ALBRECHT ENGINEERING INC, DATED FEBRUARY 16, 2015

   INFORMATION SHOW ON THESE DRAWINGS ALSO INCLUDES SITE VISITS. THIS INFORMATION IS DEEMED RELIABLE BUT ACTUAL FIELD CONDITIONS MAY VARY.
2. THE CONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND MEMBER SIZES BEFORE PROCEEDING WITH THE WORK. IF THE EXISTING CONDITIONS DIFFER FROM THAT SHOWN ON THESE DRAWINGS DISCONTINUE WORK AND OBTAIN DIRECTION FROM THE ENGINEER OF RECORD.
3. DO NOT REMOVE OR CUT ANY BEAMS, COLUMNS, JOISTS, WALLS OR OTHER BUILDING COMPONENTS UNLESS INDICATED OR APPROVED BY THE ENGINEER OF RECORD IN WRITING.
4. TAKE PRECAUTIONS NECESSARY TO AVOID DAMAGE TO EXISTING STRUCTURES.
5. REFER TO ARCHITECTURAL DRAWINGS FOR DEMOLITION WORK OF EXISTING STRUCTURE.

DEMOLITION WORKS:

1. CONTRACTOR MUST PROVIDE ADEQUATE SHORING PRIOR TO DEMOLITION AND DURING THE COURSE OF CONSTRUCTION WORKS. SUBMIT DESIGN DRAWING CALCULATIONS STAMPED BY AN ENGINEER FOR ALL SHORING SUPPORT.
2. PROTECT-IN-PLACE ITEMS WHICH ARE NOT PART OF PROJECT AND ITEMS TO REMAIN.

STRUCTURAL STEEL:

1. STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING DESIGNATIONS, UNO:
   W SHAPES ASTM A992
   CHANNELS ASTM A36
   ANGLES ASTM A36
   OTHER SHAPES AND PLATES ASTM A36
2. BOLTS SHALL BE MINIMUM 3/4" DIAMETER AND SHALL CONFORM TO THE FOLLOWING DESIGNATIONS, UNO:
   HIGH STRENGTH BOLTS ASTM A325 OR A490
3. WELDING ELECTRODES AND FLUXES SHALL CONFORM TO ONE OF THE SPECIFICATIONS OF THE AWS LISTED IN STRUCTURAL WELDING CODE - STEEL, AWS D1.1. ELECTRODES SHALL HAVE A MINIMUM TENSILE STRENGTH OF 70 KSI.
4. FILLET WELDS SHALL HAVE A MINIMUM SIZE OF 1/4", UNLESS OTHERWISE INDICATED.
5. IF PARTS JOINED BY FILLET WELDS ARE SEPARATED BY MORE THAN 1/16". THE LEG OF THE FILLET WELD SHALL BE INCREASED BY THE AMOUNT OF THE ROOT OPENING. ROOT OPENING SHALL NOT EXCEED 3/16".
6. BOLTED CONNECTIONS SHALL HAVE A MINIMUM OF 2 BOLTS, UNO.
7. HIGH STRENGTH BOLTED CONNECTIONS SHALL BE SLIP-CRITICAL FOR MEMBERS WITH OVERSIZED HOLES, SLOTTED HOLES WHERE THE FORCE IS ACTING IN THE SAME DIRECTION AS THE SLOT, WHERE AXIAL REACTIONS ARE NOTED, MOMENT CONNECTIONS, AND BEAM SPLICES. OTHER HIGH STRENGTH BOLTED SHEAR CONNECTIONS MAY BE TIGHTENED TO THE SNUG TIGHT CONDITION, UNO.
8. ALL STEEL EXPOSED TO WEATHER SHALL BE HOT-DIPPED GALVANIZED.
9. DO NOT FIELD CUT STRUCTURAL STEEL MEMBERS WITHOUT THE WRITTEN APPROVAL OF THE STRUCTURAL ENGINEER OF RECORD.
10. DO NOT SPLICE STEEL MEMBERS EXCEPT WHERE SPECIFICALLY DETAILED ON THE DRAWINGS WITHOUT THE WRITTEN APPROVAL OF THE STRUCTURAL ENGINEER OF RECORD.
11. THIS STRUCTURE IS CONSIDERED A NON-SELF-SUPPORTING LATERAL STEEL FRAME. THE CONTRACTOR SHALL PROVIDE ADEQUATE TEMPORARY BRACING AND SUPPORTS UNTIL ALL PERMANENT BRACING, MOMENT CONNECTIONS, CONNECTIONS TO SHEAR WALLS, AND FLOOR/ROOF SLABS ARE IN PLACE.
12. SEE SPECIFICATIONS DIVISION 5 FOR ADDITIONAL REQUIREMENTS.

ABBREVIATIONS:

ACI	AMERICAN CONCRETE INSTITUTE
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPROX	APPROXIMATELY
AR	ANCHOR ROD
ARCH	ARCHITECTURAL
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING & MATERIALS
AWS	AMERICAN WELDING SOCIETY
B	BOTTOM
B/	BOTTOM OF
BLDG	BUILDING
BOT	BOTTOM
CJP	COMPLETE JOINT PENETRATION
CLR	CLEAR
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
CONC	CONCRETE
CONT	CONTINUOUS
COORD	COORDINATE
DIA	DIAMETER
DN	DOWN
DTLS	DETAILS
DWG	DRAWING
EA	EACH
EL	ELEVATION
ELECT	ELECTRICAL
EOR	ENGINEER OF RECORD
EQ	EQUAL
EQUIP	EQUIPMENT
(E)	EXISTING
FT	FOOT/FEET
FP	FIRE PROTECTION
GALV	GALVANIZE
GL	GRIDLINE
GPR	GROUND PENETRATING RADAR
H	HIGH OR HORIZONTAL
HORIZ	HORIZONTAL
HP	HIGH POINT
HS	HIGH STRENGTH
IN	INCH(ES)
JT	JOINT
L	LENGTH
LBS	POUNDS
LLH	LONG LEG HORIZ
LLV	LONG LEG VERT
LP	LOW POINT
MAX	MAXIMUM
MANUF	MANUFACTURER
MECH	MECHANICAL
MEP	MECH/ELECT/PLUMBING
MIN	MINIMUM
(N)	NEW
OC	ON CENTER
OPNG	OPENING
OPP	OPPOSITE
PJP	PARTIAL JOINT PENETRATION
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
REF	REFERENCE
REQ'D	REQUIRED
SCHED	SCHEDULE
SC	SLIP CRITICAL
SDI	STEEL DECK INSTITUTE
SDL	SUPERIMPOSED DEAD LOAD
SEC	SECONDS
SIM	SIMILAR
STD	STANDARD
SJI	STEEL JOIST INSTITUTE
STL	STEEL
STRUCT	STRUCTURAL
T	TOP OR TREAD
T/	TOP OF
TOF	TOP OF FOOTING
TOS	TOP OF STEEL
THK	THICK
TMS	THE MASONRY SOCIETY
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VERT	VERTICAL
VIF	VERIFY IN THE FIELD
W	WIDTH
WP	WORK POINT

STRUCTURAL TESTS AND INSPECTIONS:

1. THE CONTRACTOR WILL RETAIN THE SERVICES OF AN INDEPENDENT TESTING AND INSPECTION AGENCY (AGENCY) TO CONFIRM THE STRUCTURAL WORK IS IN CONFORMANCE WITH CONTRACT DOCUMENTS.
2. THE AGENCY SHALL BE AUTHORIZED TO WORK IN VIRGINIA, HAVE BEEN IN BUSINESS FOR A MINIMUM OF FIVE YEARS AND SUCCESSFULLY COMPLETED FIVE PROJECTS OF SIMILAR SCOPE AND COMPLEXITY TO THIS PROJECT.
3. ALL TESTING AND INSPECTION SHALL BE PERFORMED BY OR UNDER THE DIRECT SUPERVISION OF A QUALIFIED PROFESSIONAL ENGINEER REGISTERED TO PRACTICE IN VIRGINIA.
4. PROMPTLY NOTIFY THE OWNER, ENGINEER OF RECORD AND THE CONTRACTOR OF OBSERVED IRREGULARITIES OR DEFICIENCIES OF WORK OR PRODUCTS. MAINTAIN A REPORT OF ALL DEFICIENCIES AND DOCUMENT THE CORRECTIVE ACTION.
5. SUBMIT A WRITTEN REPORT OF EACH FIELD INSPECTION AND TEST WITHIN SEVEN DAYS OF COMPLETING THE INSPECTION OR TEST.
6. CONTRACTOR'S RESPONSIBILITIES:
   a. COOPERATE WITH THE TESTING AND INSPECTION AGENCY AND ENABLE ACCESS TO THE WORK.
   b. PROVIDE THE AGENCY WITH ADEQUATE ADVANCE NOTIFICATION THAT WORK REQUIRING TESTING OR INSPECTION IS BEING PERFORMED SO THEY CAN ASSIGN PERSONNEL AND SCHEDULE THE TESTS.
   c. IF INITIAL INSPECTIONS AND TESTS INDICATE THE WORK DOES NOT COMPLY WITH THE CONTRACT DOCUMENTS THE CONTRACTOR SHALL PAY FOR ADDITIONAL INSPECTION AND TESTING SERVICES AS MAY BE REQUIRED UNTIL THE WORK CONFORMS WITH THE CONTRACT DOCUMENTS.
7. BASED ON THE RESULTS OF INSPECTIONS AND TESTS PERFORMED, CERTIFY THAT THE WORK HAS BEEN PERFORMED IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. CERTIFICATION SHALL BE SEALED AND SIGNED BY THE PROFESSIONAL ENGINEER SUPERVISING THE INSPECTION AND TESTING.
8. PERFORM INSPECTIONS, SAMPLING, AND TESTING BASED ON THE REQUIREMENTS OF THE IBC 2018, CHAPTER 17 AND AS FOLLOWS:
   a. STRUCTURAL STEEL:
      1. VERIFY THAT STEEL CONSTRUCTION IS IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
      2. PERFORM VISUAL INSPECTION OF WELDS, MEASURE 50% OF WELDS.

IBC 2018 SCHEDULE OF SPECIAL INSPECTION SERVICES

REQUIRED VERIFICATIONS AND INSPECTION OF STEEL CONSTRUCTION

MATERIAL / ACTIVITY	SERVICE	INSPECTION REQUIRED		EXTENT OF INSPECTION
		YES	NO	
1705.2 STEEL CONSTRUCTION				
1. FABRICATOR AND ERECTOR DOCUMENTS (VERIFY REPORTS AND CERTIFICATES AS LISTED IN AISC 360, CHAPTER N, PARAGRAPH 3.2 FOR COMPLIANCE WITH CONSTRUCTION DOCUMENTS)	SUBMITTAL REVIEW	X		EACH SUBMITTAL
2. MATERIAL VERIFICATION OF STRUCTURAL STEEL				
A. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARD SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS.	SHOP (3) AND FIELD INSPECTION	X		PERIODIC
B. MANUFACTURER'S CERTIFIED MILL TEST REPORT REQUIRED.	SUBMITTAL REVIEW	X		PERIODIC
3. VERIFY MEMBER LOCATIONS, BRACES, STIFFENERS, AND APPLICATION OF JOINT DETAILS AT EACH CONNECTION COMPLY WITH CONSTRUCTION DOCUMENTS	FIELD INSPECTION	X		PERIODIC
4. MATERIAL VERIFICATION OF WELD FILLER MATERIAL:				
A. IDENTIFICATION MARKINGS TO CONFORM TO AWS SPECIFICATION IN THE APPROVED CONSTRUCTION DOCUMENTS.	SHOP (3) AND FIELD INSPECTION	X		PERIODIC
B. MANUFACTURER'S CERTIFICATE OF COMPLIANCE REQUIRED.	SUBMITTAL REVIEW	X		PERIODIC
5. STRUCTURAL STEEL WELDING				
A. INSPECTION TASKS PRIOR TO WELDING (OBSERVE, OR PERFORM FOR EACH WELDED JOINT OR MEMBER, THE QA TASKS LISTED IN AISC 360, TABLE N5.4-1)	SHOP (3) AND FIELD INSPECTION	X		OBSERVE OR PERFORM AS NOTED (4)
B. INSPECTION TASKS DURING WELDING (OBSERVE, OR PERFORM FOR EACH WELDED JOINT OR MEMBER, THE QA TASKS LISTED IN AISC 360, TABLE N5.4-2)	SHOP (3) AND FIELD INSPECTION	X		OBSERVE (4)
C. INSPECTION TASKS AFTER WELDING (OBSERVE, OR PERFORM FOR EACH WELDED JOINT OR MEMBER, THE QA TASKS LISTED IN AISC 360, TABLE N5.4-3)	SHOP (3) AND FIELD INSPECTION	X		OBSERVE OR PERFORM AS NOTED (4)
D. NONDESTRUCTIVE TESTING (NDT) OF WELDED JOINTS				
1) MULTI-PASS FILLET WELDS	SHOP (3) AND FIELD INSPECTION	X		PERIODIC
2) SINGLE-PASS FILLET WELDS > 5/16"	SHOP (3) AND FIELD INSPECTION	X		PERIODIC
3) SINGLE-PASS FILLET WELDS < 5/16"	SHOP (3) AND FIELD INSPECTION	X		PERIODIC
4) COMPLETE AND PARTIAL PENETRATION GROOVE WELDS 5/16" OR GREATER IN RISK CATEGORY III OR IV	SHOP (3) OR FIELD ULTRASONIC TESTING - 100%		X	PERIODIC
5) COMPLETE AND PARTIAL PENETRATION GROOVE WELDS 5/16" OR GREATER IN RISK CATEGORY II	SHOP (3) OR FIELD ULTRASONIC TESTING - 10% OF WELDS MINIMUM	X		CONTINUOUS
6) THERMALLY CUT SURFACES OF ACCESS HOLES WHEN MATERIAL I > 2"	SHOP (3) OR FIELD MAGNETIC PARTIAL OR PENETRANT TESTING		X	PERIODIC
7) WELDED JOINTS SUBJECT TO FATIGUE WHEN REQUIRED BY AISC 360, APPENDIX 3, TABLE A-3.1	SHOP (3) OR FIELD RADIOGRAPHIC OR ULTRASONIC TESTING		X	PERIODIC
8) FABRICATOR'S NDT REPORTS WHEN FABRICATOR PERFORMS NDT	VERIFY REPORTS		X	EACH SUBMITTAL (5)

NOTES:

1. THE INSPECTION AND TESTING AGENT(S) SHALL BE ENGAGED BY THE GENERAL CONTRACTOR, AND NOT BY THE SUBCONTRACTOR WHOSE WORK IS TO BE INSPECTED OR TESTED. ANY CONFLICT OF INTEREST MUST BE DISCLOSED TO THE BUILDING OFFICIAL PRIOR TO COMMENCING WORK. THE QUALIFICATIONS OF THE SPECIAL INSPECTOR(S) AND/OR TESTING AGENCIES MAY BE SUBJECT TO THE APPROVAL OF THE BUILDING OFFICIAL AND/OR THE DESIGN PROFESSIONAL.
2. THE LIST OF SPECIAL INSPECTORS MAY BE SUBMITTED AS A SEPARATE DOCUMENT, IF NOTED SO ABOVE.
3. SPECIAL INSPECTIONS AS REQUIRED BY SECTION 1704.2.5 ARE NOT REQUIRED WHERE THE FABRICATOR IS APPROVED IN ACCORDANCE WITH THE IBC SECTION 1704.2.5.1.
4. OBSERVE ON A RANDOM BASIS, OPERATIONS NEED NOT BE DELAYED PENDING THESE INSPECTIONS. PERFORM THESE TASKS FOR EACH WELDED JOINT, BOLTED CONNECTION, OR STEEL ELEMENT.
5. NDT OF WELDS COMPLETED IN AN APPROVED FABRICATOR'S SHOP MAY BE PERFORMED BY THAT FABRICATOR WHEN APPROVED BY THE AHJ. REFER TO AISC 360, N6.

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STATE OF MARYLAND — HEATHER THOMAS — No. 25124 — PROFESSIONAL ENGINEER

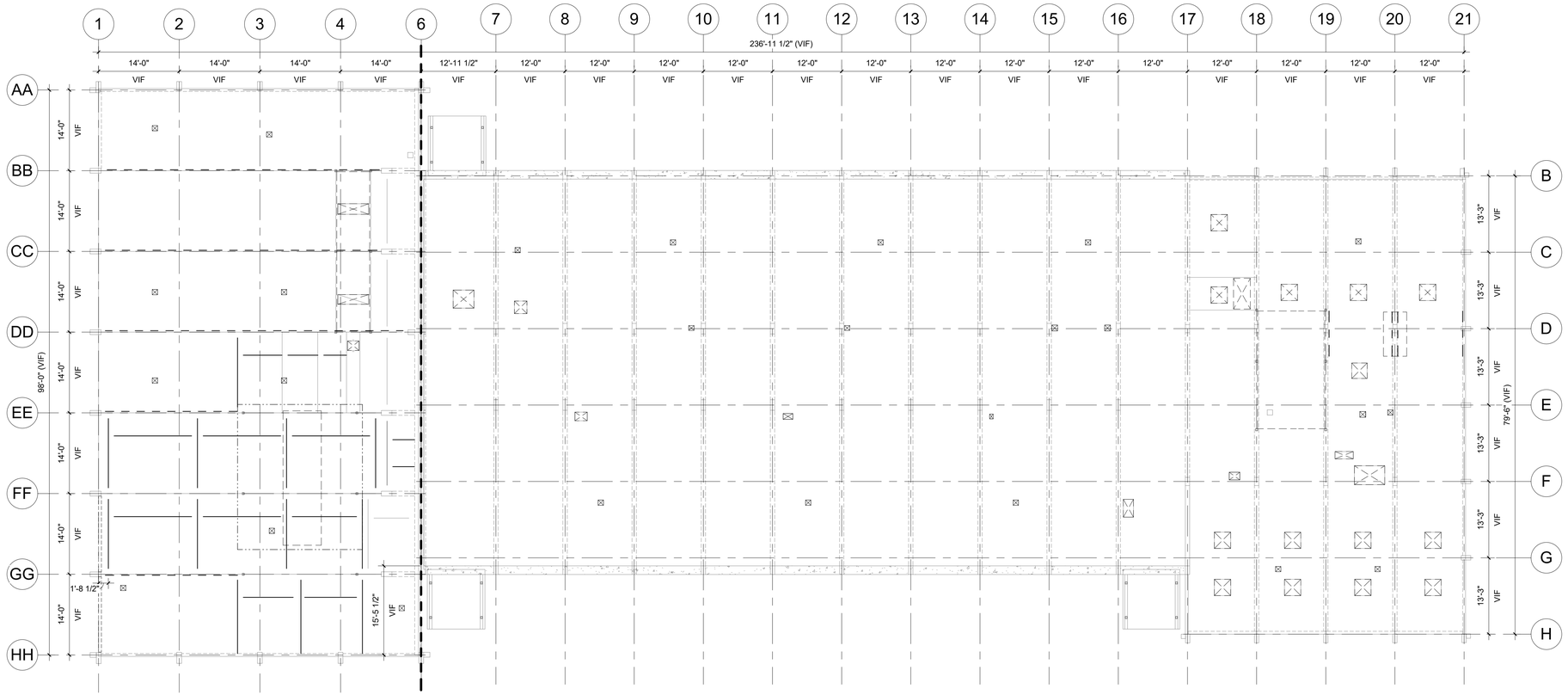
PROFESSIONAL CERTIFICATION 01/04/2023
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland. License No. 25124, Expiration Date 06/22/2024.

SHEET TITLE
GENERAL NOTES

DRAWN BY AM | CHECKED BY HT | SHEET NO S-001

SET DESCRIPTION 100% CONSTRUCTION DOCUMENTS

DATE 12/29/2023



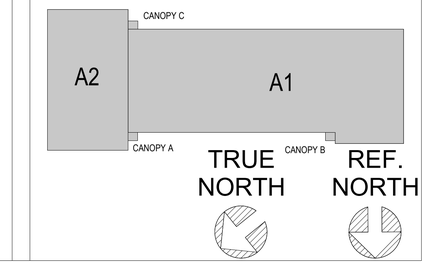
1 S-100 OVERALL ROOF FRAMING PLAN

3/32" = 1'-0" 0 8' 16' 24'

NOTES:

1. ALL DIMENSIONS AND EXISTING STRUCTURE SHOWN ARE BASED ON EXISTING DRAWINGS DATED JUNE 16, 1961 AND FEBRUARY 16, 2015. THIS MAY NOT REFLECT EXACT EXISTING DIMENSIONS. FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS BEFORE STARTING CONSTRUCTION AND/OR SUBMITTING SHOP DRAWINGS. ANY DISCREPANCIES SHALL BE REPORTED TO THE STRUCTURAL ENGINEER OF RECORD.
2. FOR MORE INFORMATION, REFER TO ENLARGED PLANS ON S-100 SERIES SHEETS.

KEY PLAN



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202 EAST NORTH AVENUE
BALTIMORE, MD. 21202

MEP ENGINEER
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STRUCTURAL ENGINEER
LEUTERIO THOMAS, LLC
6710 OXON HILL RD., SUITE 300
NATIONAL HARBOR, MD 20745
301-203-1784

REVISIONS		
DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/29/2023	3	100% CONTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

PROFESSIONAL CERTIFICATION 01/04/2023
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License No. 25124, Expiration Date 05/22/2024.

SHEET TITLE
OVERALL ROOF FRAMING PLAN

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100% CONSTRUCTION DOCUMENTS

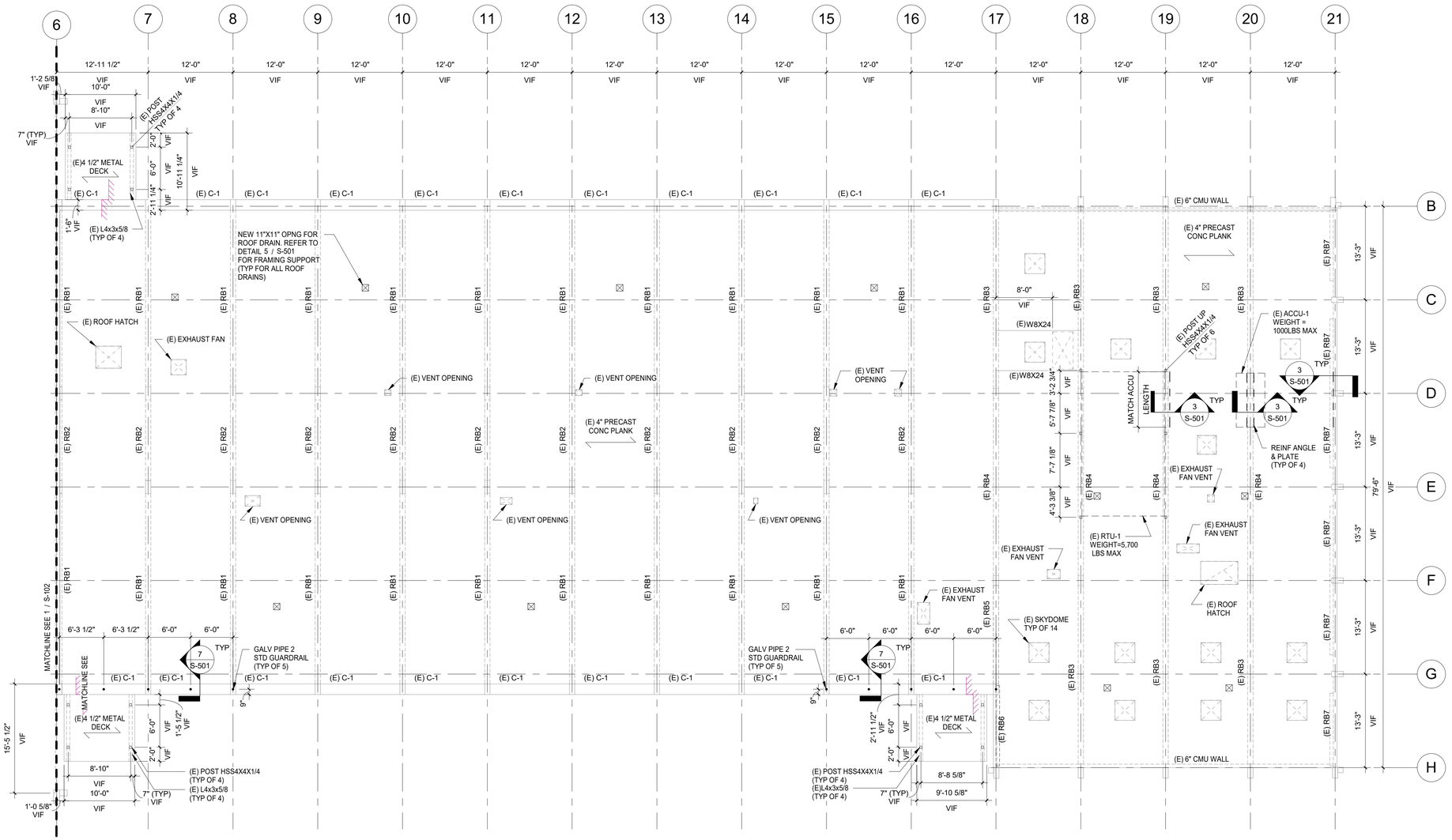
DATE
12/29/2023

SHEET NO
S-100

STAPLE EDGE

1/4/2024 10:05:43 AM C:\Users\gdatu\Documents\1515-MT.WASHINGTON-STRUCT-v23_gervin.datu.rvt

THIS SHEET IS 30" X 42" AT FULL SIZE.



1 S-101 ROOF FRAMING PLAN AREA A1

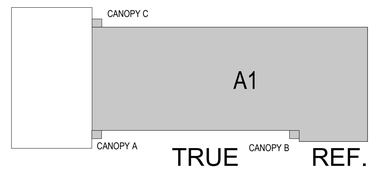
1/8" = 1'-0"

0 4' 8' 16'

NOTES:

1. ALL DIMENSIONS AND EXISTING STRUCTURE SHOWN ARE BASED ON EXISTING DRAWINGS DATED JUNE 16, 1961 AND FEBRUARY 16, 2015. THIS MAY NOT REFLECT EXACT EXISTING DIMENSIONS. FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS BEFORE STARTING CONSTRUCTION AND/OR SUBMITTING SHOP DRAWINGS. ANY DISCREPANCIES SHALL BE REPORTED TO THE STRUCTURAL ENGINEER OF RECORD.
2. THE TOP OF ALL NEW STEEL BEAMS SHALL MATCH THE UNDERSIDE OF PLANK ELEVATION. CONTRACTOR TO VERIFY IN THE FIELD THE UNDERSIDE PLANK ELEVATION.
3. SPACING OF INTERMEDIATE NEW BEAMS CAN VARY DEPENDING ON THE CONDITIONS IN THE FIELD. ADJUST SPACING ACCORDINGLY TO AVOID CONFLICT WITH EXISTING UTILITIES. MAXIMUM SPACING SHALL NOT BE MORE THAN 20'-0" OC.
4. REFER TO ARCHITECTURAL DRAWINGS FOR RELATED DEMOLITION REQUIREMENTS NOT SHOWN ON THIS PLAN.
5. REFER TO ARCHITECTURAL DRAWINGS FOR ALL REROOFING DETAILS AND OTHER RELATED DETAILS NOT SHOWN ON THIS PLAN.
6. REFER TO MECHANICAL DRAWINGS FOR THE EXACT LOCATION OF ROOFTOP UNITS AND RELATED ITEMS NOT SHOWN ON THIS PLAN.
7. THE EXISTING ROOFING SYSTEM SHALL BE DEMOLISHED EXCEPT FOR THE EXISTING INSULATING CONCRETE PRIOR TO INSTALLATION OF THE NEW ROOFING.
8. REUSE EXISTING FRAMING TO SUPPORT NEW EXHAUST FANS AND RELATED DUCT WORKS TO BE REPLACED IN KIND AND TO REMAIN IN PLACE. THE EOR SHALL BE NOTIFIED IF THERE ARE ANY DISCREPANCIES OR DEFICIENCIES IN THE EXISTING FRAMING FOUND DURING DEMOLITION.

KEY PLAN



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12/29/2023	3	100% CONTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · HOWARD TUTTLE · No. 25124 · PROFESSIONAL ENGINEER

PROFESSIONAL CERTIFICATION 01/04/2023
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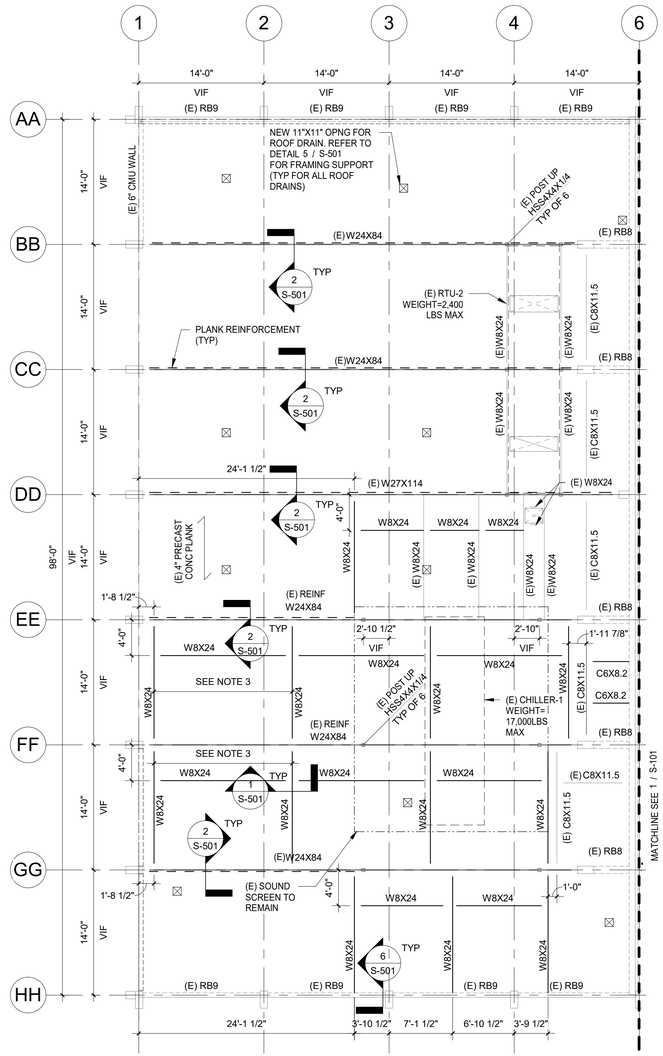
SHEET TITLE
ENLARGED ROOF FRAMING PLAN AREA A1

DRAWN BY	CHECKED BY	SHEET NO
AM	HT	S-101

SET DESCRIPTION: 100% CONSTRUCTION DOCUMENTS
DATE: 12/29/2023

STAPLE EDGE



1 S-102 ROOF FRAMING PLAN AREA A2

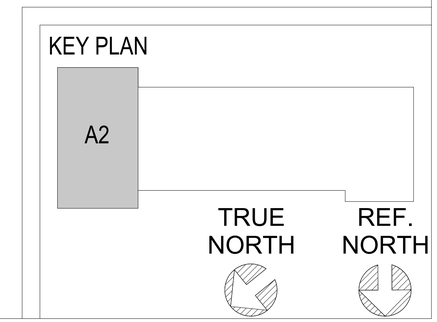
1/8" = 1'-0"

0 4' 8' 16'

NOTES:

1. ALL DIMENSIONS AND EXISTING STRUCTURE SHOWN ARE BASED ON EXISTING DRAWINGS DATED JUNE 16, 1961 AND FEBRUARY 16, 2015. THIS MAY NOT REFLECT EXACT EXISTING DIMENSIONS. FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS BEFORE STARTING CONSTRUCTION AND/OR SUBMITTING SHOP DRAWINGS. ANY DISCREPANCIES SHALL BE REPORTED TO THE STRUCTURAL ENGINEER OF RECORD.
2. THE TOP OF ALL NEW STEEL BEAMS SHALL MATCH THE UNDERSIDE OF PLANK ELEVATION. CONTRACTOR TO VERIFY IN THE FIELD THE UNDERSIDE PLANK ELEVATION.
3. SPACING OF INTERMEDIATE NEW BEAMS CAN VARY DEPENDING ON THE CONDITIONS IN THE FIELD. ADJUST SPACING ACCORDINGLY TO AVOID CONFLICT WITH EXISTING UTILITIES. MAXIMUM SPACING SHALL NOT BE MORE THAN 20'-0" OC.
4. REFER TO ARCHITECTURAL DRAWINGS FOR RELATED DEMOLITION REQUIREMENTS NOT SHOWN ON THIS PLAN.
5. REFER TO ARCHITECTURAL DRAWINGS FOR ALL REROOFING DETAILS AND OTHER RELATED DETAILS NOT SHOWN ON THIS PLAN.
6. REFER TO MECHANICAL DRAWINGS FOR THE EXACT LOCATION OF ROOFTOP UNITS AND RELATED ITEMS NOT SHOWN ON THIS PLAN.
7. THE EXISTING ROOFING SYSTEM SHALL BE DEMOLISHED EXCEPT FOR THE EXISTING INSULATING CONCRETE PRIOR TO INSTALLATION OF THE NEW ROOFING.
8. REUSE EXISTING FRAMING TO SUPPORT NEW EXHAUST FANS AND RELATED DUCT WORKS TO BE REPLACED IN KIND AND TO REMAIN IN PLACE. THE EOR SHALL BE NOTIFIED IF THERE ARE ANY DISCREPANCIES OR DEFICIENCIES IN THE EXISTING FRAMING FOUND DURING DEMOLITION.

KEY PLAN



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PROJECT NAME
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PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · ANDREW J. MILLER · No. 25124 · PROFESSIONAL ENGINEER

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SHEET TITLE
ENLARGED ROOF FRAMING PLAN AREA A2

DRAWN BY	CHECKED BY	SHEET NO
AM	HT	S-102

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100% CONSTRUCTION DOCUMENTS

DATE
12/29/2023

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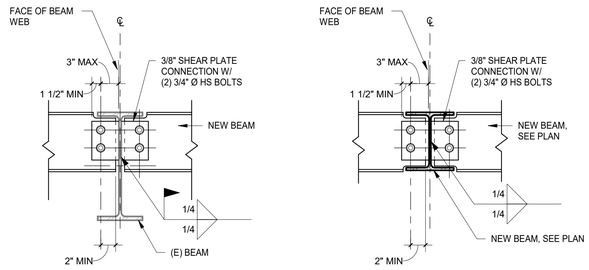
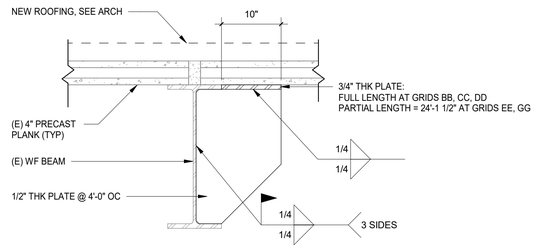


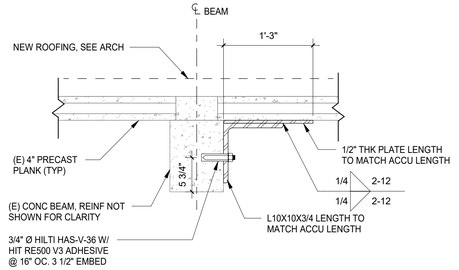
1 S-501 TYPICAL BEAM TO BEAM SHEAR CONNECTION

1" = 1'-0"



2 S-501 PRECAST DECK REINFORCEMENT

1" = 1'-0"

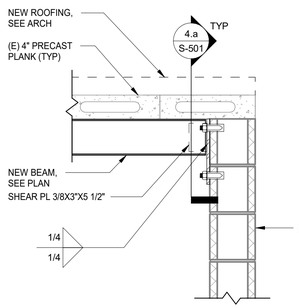


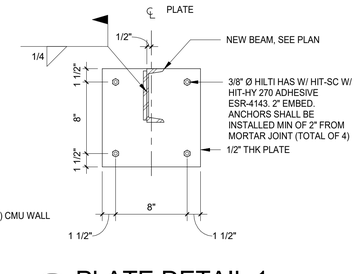
NOTE:

1. SEE PLAN FOR LOCATION OF ANGLE REINFORCEMENT. DETAIL SHALL BE SYMMETRICAL ALONG THE GRIDLINE 20.
2. CONTRACTOR MUST PERFORM GPR PRIOR TO INSTALLING ANCHORS IN CONCRETE TO AVOID CUTTING OR DAMAGING EXISTING REINFORCEMENT.

3 S-501 PRECAST DECK REINFORCEMENT CONNECTION AT CONCRETE BEAM

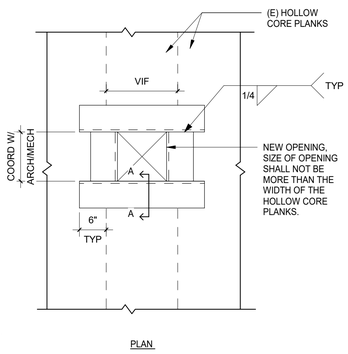
1" = 1'-0"



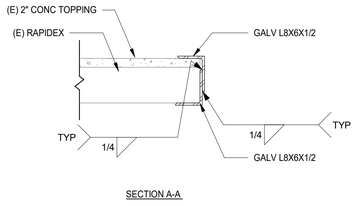


4.a S-501 PLATE DETAIL 1

1 1/2" = 1'-0"



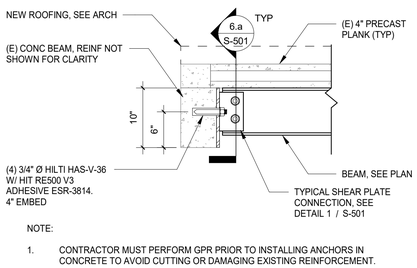
PLAN



SECTION A-A

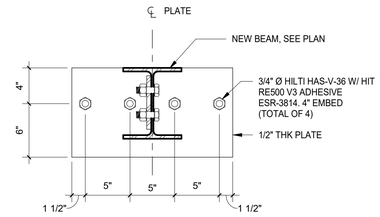
4 S-501 NEW BEAM CONNECTION TO (E) CMU WALL

1" = 1'-0"



NOTE:

1. CONTRACTOR MUST PERFORM GPR PRIOR TO INSTALLING ANCHORS IN CONCRETE TO AVOID CUTTING OR DAMAGING EXISTING REINFORCEMENT.



6.a S-501 PLATE DETAIL 2

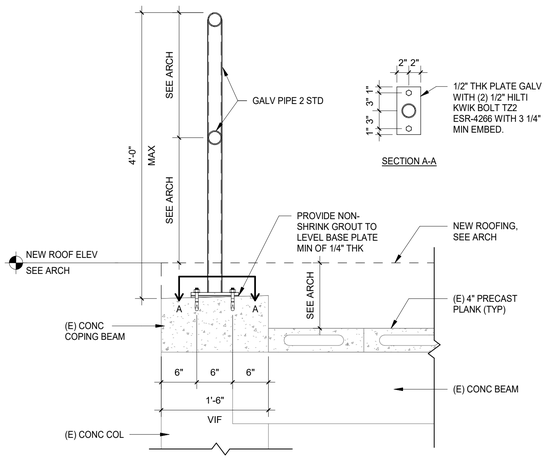
1 1/2" = 1'-0"

6 S-501 WF BEAM CONNECTION TO (E) CONC BEAM

1" = 1'-0"

5 S-501 OPENING DETAIL AT HOLLOW CORE PLANKS

3/4" = 1'-0"



NOTE:

1. CONTRACTOR MUST PERFORM GPR PRIOR TO INSTALLING ANCHORS IN CONCRETE TO AVOID CUTTING OR DAMAGING EXISTING REINFORCEMENT.

7 S-501 GUARDRAIL CONNECTION TO BEAM

1" = 1'-0"

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PROJECT NAME
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PSC#: 30.268.21/23

PROJECT ADDRESS
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PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND — HOWARD TAYLOR THOMAS — No. 25124 — PROFESSIONAL ENGINEER

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SHEET TITLE
TYPICAL DETAILS

DRAWN BY	CHECKED BY	SHEET NO
AM	HT	S-501

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STAPLE EDGE

1/4/2024 10:05:44 AM C:\Users\gdatu\Documents\1515-MT.WASHINGTON-STRUCT-v23_gervin.datu.rvt

THIS SHEET IS 30" X 42" ATFULL SIZE.

STAPLE EDGE

GENERAL NOTES

1. THE MECHANICAL PORTION OF THE CONTRACT DOCUMENTS FOR THIS PROJECT ARE ONLY A PORTION OF A LARGER AND MORE COMPLETE SET OF DOCUMENTS DESCRIBING ALL THE WORK REQUIRED TO PROVIDE A COMPLETE PROJECT. THERE ARE ITEMS SHOWN ON EACH OF THE CONTRACT DOCUMENTS WHICH HAVE AN IMPACT ON THE QUANTITY OF MATERIALS AND THE AMOUNT OF LABOR TO BE PROVIDED BY THE DIVISION 23 (SUB) CONTRACTOR. THE DIVISION 23 (SUB) CONTRACTOR SHALL PERFORM CAREFUL COORDINATION WITH EACH OF THE CONTRACT DOCUMENTS AS REQUIRED TO PROVIDE AN ACCURATE BID AND TO SUBSEQUENTLY PROVIDE ALL THE MATERIALS AND LABOR NECESSARY FOR COMPLETE CONFORMANCE TO THE ENTIRE SET OF CONTRACT DOCUMENTS. FAILURE OF THE (SUB) CONTRACTORS TO COORDINATE WITH ALL OF THE CONSTRUCTION DOCUMENTS, BY VIRTUE OF THIS NOTICE, SHALL NOT RELEASE THE GENERAL CONTRACTOR, THE DIVISION 23 MECHANICAL SUB CONTRACTOR OR THE DIVISION 26 ELECTRICAL (SUB) CONTRACTOR FROM THE OBLIGATIONS OF PROVIDING ALL OF THE MATERIALS AND LABOR NECESSARY TO COMPLETE THE REQUIREMENTS OF WORK INDICATED ON THE COMPLETE SET OF THE CONTRACT DOCUMENTS.
2. THE MECHANICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF LOCAL CODES AND APPLICABLE JURISDICTIONAL BODIES AS LISTED IN 'CODES AND STANDARDS' BELOW.
3. THE PROJECT SHALL BE BID ON THE BASIS OF SPECIFIED PRODUCT(S) WHICH ESTABLISH MINIMUM QUALITY REQUIREMENTS. WHERE MORE THAN ONE PRODUCT NAME IS INDICATED, BIDS SHALL BE BASED ON ONE OF THE NAMED PRODUCTS.
4. WHERE USE OF A PRODUCT REQUIRES CHANGES TO THE BASE BID DESIGN IN ORDER TO INCORPORATE THE PRODUCT INTO THE PROJECT, THE CONTRACTOR SHALL SUBMIT A LAYOUT SHOWING ALL CHANGES TO ARCHITECTURAL, STRUCTURAL, ELECTRICAL, PLUMBING, AND MECHANICAL REQUIREMENTS. CHANGES DUE TO USE OF "ACCEPTABLE EQUAL" PRODUCTS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER AND THE COST OF CHANGES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE LAYOUT SHALL ACCOMPANY THE PRODUCT SUBMITTAL DATA.
5. SUBSTITUTIONS FOR "ACCEPTABLE EQUAL" PRODUCTS NOT SPECIFIED WILL BE CONSIDERED WHEN INCLUDED WITH SUBMISSION OF THE BID AND SHALL BE SUBJECT TO ACCEPTANCE BY THE OWNER/ARCHITECT/ENGINEER. PROPOSALS FOR SUBSTITUTIONS SHALL INCLUDE, BUT NOT BE LIMITED TO: (1) ANY ADDED CREDIT OR COST, (2) PRODUCT IDENTIFICATION, (3) CODE COMPLIANCE, (4) REFERENCED STANDARD COMPLIANCE, (5) DESCRIPTION OF ALL CHANGES INCLUDING ARCHITECTURAL, STRUCTURAL, ELECTRICAL, AND MECHANICAL REQUIRED TO INCORPORATE SUBSTITUTED PRODUCT INTO THE PROJECT. THE OWNER RESERVES THE RIGHT TO REJECT PROPOSED SUBSTITUTIONS.
6. WHERE "OR EQUAL" PRODUCTS ARE INDICATED, THE BIDDER SHALL SUBMIT A LIST OF PROPOSED EQUAL SUBSTITUTE PRODUCTS WITH THE BID. THE LIST SHALL INCLUDE ADEQUATE SUPPORTING INFORMATION AS PROOF OF EQUALITY IN ORDER TO BE CONSIDERED ACCEPTABLE. NO LATER SUBSTITUTES WILL BE CONSIDERED.
7. SUBSTITUTIONS SHALL PROVIDE THE SAME GUARANTEE AS SPECIFIED FOR BASE BID PRODUCTS.
8. THE CONTRACTOR SHALL VERIFY FIELD CONDITIONS FOR POINTS OF CONNECTIONS, CAPACITIES, AND ELEVATIONS OF SYSTEMS. IN ALL AREAS AFFECTED BY THE PROJECT, CUT, PATCH, REPAIR, AND/OR REPLACE ALL MATERIALS DAMAGED AS A RESULT OF WORK. ALL REPAIRED FINISHES SHALL MATCH APPROPRIATE ADJACENT FINISHES. FILL VOIDS AROUND PIPING PENETRATING WALLS.
9. PROVIDE ALL NECESSARY FOUNDATIONS, SUPPORTS, PADS, AND BASES AS REQUIRED FROM MECHANICAL EQUIPMENT AND PIPING AS PER INTERNATIONAL BUILDING AND MECHANICAL CODES. INSTALL EQUIPMENT AND PIPING SO AS TO BE FREE FROM OBJECTIONABLE NOISE AND VIBRATIONS. CONTRACTOR SHALL COORDINATE WORK WITH STRUCTURAL AND ARCHITECTURAL DRAWINGS PRIOR TO ACTUAL WORK.
10. SYMBOLS, ABBREVIATIONS, AND MECHANICAL GENERAL NOTES ARE COMPOSITE. ALL SYMBOLS, ABBREVIATIONS, AND MECHANICAL NOTES MAY NOT BE USED ON THIS PROJECT.
11. WORK INDICATED ON THESE DRAWINGS IS DIAGRAMMATIC AND SHOULD NOT BE SCALED TO ESTABLISH LOCATION OF WORK. THE DRAWINGS ARE INTENDED TO CONVEY THE SCOPE OF WORK AND INDICATE GENERAL ARRANGEMENTS OF ENGINEERED SYSTEMS. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS IN THE FIELD AND MAKE ADJUSTMENTS AS NECESSARY TO COMPLETE THE WORK.
12. FURNISH ALL LABOR, MATERIALS, TOOLS, EQUIPMENT, AND SERVICES FOR ALL WORK, IN ACCORDANCE WITH PROVISIONS OF THE CONTRACT DOCUMENTS. ALTHOUGH SUCH WORK IS NOT SPECIFICALLY INDICATED, FURNISH AND INSTALL ALL SUPPLEMENTARY OR MISCELLANEOUS ITEMS, APPURTENANCES, AND DEVICES INCIDENTAL TO OR NECESSARY FOR A SOUND, SECURE AND COMPLETE INSTALLATION, AT NO ADDITIONAL COST TO THE OWNER.
13. IT IS THE INTENTION OF THE CONTRACT DOCUMENTS TO CALL FOR FINISHED WORK, TESTED, AND READY FOR OPERATION. ALL MATERIALS AND EQUIPMENT SHALL BE NEW, OF FIRST QUALITY AND COMPATIBLE WITH EXISTING SYSTEMS OR MATERIAL WHERE THEY INTERFACE, UNLESS OTHERWISE INDICATED.
14. CLEAN UP ALL WASTE AND DEBRIS AT THE END OF EACH WORKING DAY AND AS REQUIRED TO KEEP ALL BUILDING AREAS CLEAN, CLEAR, AND UNOBSTRUCTED. AT THE COMPLETION OF THE PROJECT, THE CONTRACTOR SHALL REMOVE ALL TOOLS, APPLIANCES, SURPLUS MATERIAL, AND SCRAP FROM THE JOB SITE. SEE ARCH. DWGS. FOR WASTE DISPOSAL REQUIREMENTS.
15. AT THE COMPLETION OF THE PROJECT, THE CONTRACTOR SHALL CLEAN THE ENTIRE JOB SITE, INCLUDING ALL NEW AND EXISTING SURFACES OF BUILDING, EQUIPMENT, AND SYSTEMS, LEAVING THE AREA THOROUGHLY CLEAN, CLEAR, AND READY FOR OCCUPANCY.
16. ALL SPECIFIED EQUIPMENT AND SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
17. IN ADHERENCE WITH THE INTENT OF THESE CONTRACT DOCUMENTS, PROVIDE FINISHED WORK, TESTED, AND READY FOR OPERATION. WHEREVER THE WORD "PROVIDE" IS USED, IT SHALL MEAN "FURNISHED, INSTALL, BALANCE, ADJUST AND TEST, COMPLETE AND READY FOR USE".
18. CONTRACTOR SHALL VISIT SITE TO VERIFY EXISTING CONDITIONS AND COORDINATE WITH PIPING, DUCTWORK, LIGHTING, AND PROPOSED CEILING HEIGHTS. SUBMIT A COORDINATION SHOP DRAWINGS FOR REVIEW PRIOR TO ORDERING, FABRICATING, OR INSTALLING ITEMS.
19. ALL PIPES SHALL BE INSTALLED IN A NEAT AND ORDERLY APPEARANCE AND FREE FROM CONTACT WITH STRUCTURE OR INSTALLED ITEMS.

MECHANICAL GENERAL NOTES:

1. ALL EQUIPMENT INCLUDING PIPING SHALL BE SECURELY SUPPORTED FROM THE BUILDING STRUCTURE IN AN APPROVED MANNER. EQUIPMENT SHALL NOT GENERATE NOISE GREATER THAN CATALOG RATINGS. ALL EQUIPMENT AND APPURTENANCES SHALL NOT TRANSMIT NOISE OR VIBRATION TO THE OCCUPIABLE SPACES.
2. PROVIDE FIRE SAFING APPROVED BY THE AUTHORITY HAVING JURISDICTION, AROUND ALL PIPING/DUCT PENETRATIONS THROUGH BUILDING CONSTRUCTION TO MAINTAIN FIRE, SMOKE, AND SOUND RATINGS.
3. MECHANICAL CONTRACTOR SHALL PROVIDE ALL MOTOR STARTERS, DISCONNECTS, ETC., AS REQUIRED BY THE MECHANICAL EQUIPMENT; THE ELECTRICAL CONTRACTOR SHALL INSTALL AND PROVIDE FINAL CONNECTIONS. WHERE THE MECHANICAL SYSTEMS COME WITH INTEGRAL STARTERS, DISCONNECTS, ETC., THE ELECTRICAL CONTRACTOR SHALL PROVIDE FINAL CONNECTIONS.
4. ALL EQUIPMENT MUST BE INSTALLED SUCH THAT FACTORY REQUIRED CLEARANCES FOR SERVICEABILITY ARE MAINTAINED. NOTIFY THE ENGINEER IMMEDIATELY SHOULD ANY EQUIPMENT HAVE ACCESS LIMITED BECAUSE OF FIELD CONDITIONS, EQUIPMENT ORIENTATION, ETC. DO NOT INSTALL THIS EQUIPMENT UNTIL THE SITUATION HAS BEEN RESOLVED.
5. THE CONTRACTOR SHALL GUARANTEE ALL MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF ACCEPTANCE BY THE OWNER AND SHALL REPAIR OR REPLACE AT NO ADDITIONAL COST TO THE OWNER ANY PART THEREOF WHICH MAY BECOME DEFECTIVE DURING THE PERIOD OF GUARANTEE, ORDINARY WEAR AND TEAR EXCEPTED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AND PAY FOR ANY DAMAGES RESULTING FROM OR CAUSED BY DEFECTS IN HIS/HER WORK.
6. ALL WORK SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES AND SAFETY REGULATIONS.

CODE, PERMITS AND INSPECTIONS:

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH LATEST APPLICABLE CODES, REGULATIONS, AND STANDARDS. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND SHALL ARRANGE FOR ALL INSPECTIONS BY AUTHORITIES HAVING JURISDICTION.
2. APPROVAL AND SIGN-OFF BY ALL AUTHORITIES HAVING JURISDICTION IS REQUIRED AT THE COMPLETION OF PROJECT. SECURE PERMIT AND INSPECTION CERTIFICATES AND TRANSMIT SAME TO THE OWNER AT THE COMPLETION OF THE PROJECT.
3. PERFORM ALL WORK IN ACCORDANCE WITH THE FOLLOWING CODES AND STANDARDS:
   A. INTERNATIONAL MECHANICAL CODE: 2018
   B. INTERNATIONAL ENERGY CONSERVATION CODE: 2018
   C. INTERNATIONAL FUEL GAS CODE: 2018
   D. INTERNATIONAL FIRE CODE: 2018
   E. INTERNATIONAL BUILDING CODE: 2018
   F. NATIONAL ELECTRIC CODE: 2018
4. CODES AND STANDARDS LISTED ARE MINIMUM STANDARDS. WHERE CONTRACT DOCUMENTS CALL FOR A HIGHER STANDARD, CONTRACT DOCUMENTS WILL TAKE PRECEDENCE OVER ALL REFERENCED CODES AND STANDARDS. IF CONTRACT DOCUMENTS CONFLICT WITH CODES OR STANDARDS, CONTRACTOR SHALL INFORM ARCHITECT/ENGINEER, IN WRITING, PRIOR TO QUOTE.
5. CONTRACTOR SHALL COMPLY WITH ALL OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND ENVIRONMENTAL PROTECTION AGENCY (EPA) REQUIREMENTS.
6. CONTRACTOR SHALL COMPLY WITH RULES AND REGULATIONS OF ALL AFFECTED UTILITY COMPANIES.

COORDINATION AND SCHEDULING:

1. COMPLETELY COORDINATE AND SCHEDULE WORK OF ALL TRADES. CONTRACTOR SHALL COMPENSATE FOR EXISTING CONDITIONS SO THAT CONFLICTS IN SCHEDULING AND LOCATION WILL NOT OCCUR.
2. CONTRACTOR IS RESPONSIBLE FOR COMPLETE COORDINATION BETWEEN ALL SUB-CONTRACTORS, SUPPLIERS, GOVERNMENT AUTHORITIES HAVING JURISDICTION, BUILDING PERSONNEL, CODE ENFORCEMENT OFFICIALS, ARCHITECT/ENGINEER, AND BUILDING OWNER.
3. CONTRACTOR SHALL REVIEW AND COORDINATE THE INSTALLATION OF NEW SYSTEM(S) AND EQUIPMENT. NO WORK SHALL BE PERFORMED PRIOR TO THE CONTRACTOR OBTAINING EXACT FIELD DIMENSIONS OF EXISTING BUILDINGS, EXISTING CEILINGS, STRUCTURAL OBSTRUCTIONS, EXISTING BUILDING SYSTEMS TO REMAIN, EXISTING FURNITURE TO REMAIN, ETC., WHICH, MAY AFFECT INSTALLATION OF NEW EQUIPMENT OR SYSTEMS.
4. CONTRACTOR'S ATTENTION IS DIRECTED TO THE IMPORTANCE OF PROPER SCHEDULING AND PHASING OF WORK SO AS TO CAUSE MINIMUM DISTURBANCE TO ACTIVITIES IN OTHER AREAS OF THE BUILDING, WHICH WILL REMAIN OCCUPIED THROUGHOUT THE DURATION OF THE CONTRACT. CONTRACTOR'S WORK SCHEDULE SHALL BE SUBMITTED TO AND APPROVED BY THE OWNER.
5. NOTIFY THE OWNER, IN WRITING, AT LEAST SEVEN DAYS IN ADVANCE OF ANY REQUIRED SHUTDOWN OF ANY UTILITY. OBTAIN OWNER'S WRITTEN APPROVAL PRIOR TO SHUTDOWN.
6. CONTRACTOR SHALL THOROUGHLY EXAMINE PREMISES AND OBSERVE ALL CONDITIONS AND CIRCUMSTANCES UNDER WHICH THE WORK SHALL BE PERFORMED NO ALLOWANCES WILL BE MADE FOR ERRORS OR NEGLIGENCE IN THIS RESPECT.
7. CONTRACTOR SHALL COMPLY WITH RULES AND REGULATIONS OF THE BUILDING LANDLORD AND PROPERTY MANAGER.

WARRANTY:

1. ALL WORK SHALL BE FREE OF DEFECTS IN WORKMANSHIP AND MATERIALS (EXCLUDING SPECIFIED NEW EQUIPMENT)FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL ACCEPTANCE. ALL DEFECTS THAT DEVELOP OR ARE DISCOVERED WITHIN THIS PERIOD WILL BE REPAIRED BY THE CONTRACTOR, TO THE SATISFACTION OF THE ARCHITECT/ENGINEER AND AT NO ADDITIONAL COST TO THE OWNER.
2. COORDINATE PROJECT WARRANTY PERIOD (TWO-YEAR TYPICAL) WITH THE REQUIREMENTS SET FORTH IN THE DIVISION 01 PROJECT SPECIFICATIONS FOR ALL MAJOR NEW EQUIPMENT.
3. SPECIAL WARRANTIES, EXTENDING BEYOND THE GENERAL PROJECT WARRANTY, SHALL BE PROVIDED AS APPLICABLE FOR THAT PARTICULAR DEVICE OR PIECE OF EQUIPMENT.

SUBMITTALS:

1. SUBMIT ELECTRONIC SHOP DRAWINGS, TO ARCHITECT/ENGINEER, AND OBTAIN APPROVAL, PRIOR TO ORDERING OF EQUIPMENT OR MATERIAL AND BEFORE FABRICATION OF COMPONENTS. SUBMIT SHOP DRAWINGS FOR THE FOLLOWING:
   A. AIR DISTRIBUTION DEVICES AND ACCESSORIES.
   B. ALL MANUFACTURED MECHANICAL EQUIPMENT.
      - EXHAUST FAN
      - AIR COOLED CHILLER
      - ROOF TOP UNIT

RECORD (AS BUILT) DRAWINGS:

1. REPRODUCIBLE RECORD DRAWINGS SHALL BE SUPPLIED BY CONTRACTOR, UPON WHICH CORRECTIONS SHALL BE MADE, TO PROVIDE AN ACCURATE AND COMPLETE RECORD OF THE WORK, AS INSTALLED. ALL DUCTWORK, EQUIPMENT, PIPING, AND AIR DISTRIBUTION DEVICES SHALL BE SHOWN AND DIMENSIONED ON THE RECORD DRAWINGS. CONTRACTOR SHALL PROVIDE LATEST AUTOCAD VERSION AS-BUILT DRAWINGS AT THE COMPLETION OF THE PROJECT.
2. FULL SIZE AS-BUILT DRAWINGS SHALL BE SUPPLIED AT THE COMPLETION OF THE JOB.
3. PROVIDE A COMPLETE SET OF ELECTRONIC DRAWINGS ON A CD WHEN THE JOB IS COMPLETE.

DEMONSTRATIONS AND TRAINING:

1. TWO DISTINCT TRAINING SESSIONS SHALL BE PROVIDED THROUGHOUT THE TWO-YEAR WARRANTY PERIOD, WITH EACH TRAINING SESSION OCCURRING DURING THE SPRING AND FALL OPERATING SEASON. TRAINING SESSIONS SHALL INCLUDE A COMBINATION OF CLASSROOM AND HANDS-ON DEMONSTRATIONS.
2. SPECIFICATIONS SHALL REQUIRE THE CONTRACTOR TO FURNISH THE NECESSARY TECHNICIANS, SKILLED WORKERS, AND HELPERS TO OPERATE ALL THE HVAC SYSTEMS AND EQUIPMENT OF THE ENTIRE PROJECT.
3. AT A MINIMUM, DEMONSTRATION SESSIONS SHALL INCLUDE THE FOLLOWING ACTIVITIES:
   A. INSTRUCT THE OWNER OR DESIGNER PERSONNEL IN OPERATION, MAINTENANCE, LUBRICATION, AND ADJUSTMENT OF ALL SYSTEMS AND EQUIPMENT
   B. ONSITE INSTRUCTIONS PROVIDED BY MANUFACTURER'S TECHNICAL REPRESENTATIVE FOR EACH TYPE OF EQUIPMENT, INCLUDING THE PERFORMANCE OF THE RECOMMENDED PREVENTIVE MAINTENANCE PROCEDURES FOR THAT EQUIPMENT
   C. APPROVED OPERATING AND MAINTENANCE MANUALS SHALL BE MADE AVAILABLE WITHIN THE (10) WORKING DAYS AT ANY DEMONSTRATION, ALONG WITH A CD CONTAINING ALL OPERATIONS AND MAINTENANCE DATA
   D. EACH DEMONSTRATION SESSION SHALL BE RECORDED IN DVD MEDIA FORMAT (VIDEO AND AUDIO FORMAT), INCLUDING BOTH THE SESSIONS SPECIFIED ABOVE AND ADDED SESSIONS REQUIRED IN TECHNICAL SECTIONS FOR SPECIALIZED EQUIPMENT
   E. PROVIDE ONE COMPLETE SET AT DVD'S WITH EACH OPERATING AND MAINTENANCE MANUAL

TESTING AND BALANCING:

1. PROVIDE ALL NECESSARY ACCESSORIES TO ALLOW FOR PROPER AIR BALANCE MECHANICAL SYSTEM. UPON COMPLETION OF THE INSTALLATION, ALL AIR SYSTEMS SHALL BE ADJUSTED AND BALANCED TO PROVIDE THE AIR FLOW RATE INDICATED. CONTRACTOR SHALL PROVIDE VOLUME DAMPERS, SPLITTER DAMPERS, AND/OR VOLUME EXTRACTORS AS INDICATED OR REQUIRED FOR BALANCING. BALANCING WORK SHALL BE PERFORMED BY A CERTIFIED BALANCING CONTRACTOR WHO IS A MEMBER IN GOOD STANDING OF AABC, NEBB, OR SMACNA. BALANCING WORK SHALL BE IN COMPLIANCE WITH THE STANDARD PROCEDURE MANUAL PUBLISHED BY THE TESTING AND BALANCING ORGANIZATION AFFILIATED WITH THE BALANCING CONTRACTOR. PRIOR TO ACCEPTANCE OF THE WORK, CONTRACTOR SHALL SUBMIT TO THE ARCHITECT/ ENGINEER ALL APPROPRIATE FIELD DATA ON STANDARD FORMS OF THE TESTING AND BALANCING ORGANIZATION IN ACCORDANCE WITH STANDARD PROCEDURES.
2. EQUIPMENT TESTING: EQUIPMENT FUNCTIONAL PERFORMANCE TESTING SHALL DEMONSTRATE THE INSTALLATION AND OPERATION OF COMPONENTS, SYSTEMS, AND SYSTEM TO SYSTEM INTERFACING RELATIONSHIPS IN ACCORDANCE WITH APPROVED PLANS AND SPECIFICATIONS SO THAT OPERATION, FUNCTION, AND MAINTENANCE SERVICEABILITY FOR EACH OF THE SYSTEMS IS CONFIRMED. TESTING SHALL INCLUDE ALL SPECIFIED MODES OF CONTROL AND SEQUENCE OF OPERATION, INCLUDING UNDER FULL LOAD, PART LOAD, AND ALL OF THE FOLLOWING EMERGENCY CONDITIONS:
   A. EACH MODE AS DESCRIBED IN THE SEQUENCE OF OPERATION
   B. REDUNDANT OR AUTOMATIC BACK-UP MODE
   C. PERFORMANCE OF ALARMS
   D. MODE OF OPERATION UPON LOSS OF POWER AND RESTORATION OF POWER
3. CONTROLS: HVAC CONTROL SYSTEMS SHALL BE TESTED TO DOCUMENT THAT CONTROL DEVICES, COMPONENTS, EQUIPMENT, & SYSTEMS ARE CALIBRATED ADJUSTED AND OPERATE IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS. SEQUENCE OF OPERATION SHALL BE FUNCTIONALLY TESTED TO DOCUMENT THAT THEY OPERATE IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS.
4. CONTRACTOR TO TEST OPERATION OF ALL MEP ROOFTOP EQUIPMENT PRIOR TO REMOVAL.

OPERATING AND MAINTENANCE (O&M) MANUALS:

1. WRITTEN INSTRUCTIONS IN A SINGLE BINDER DESCRIBING THE PROPER OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS SHALL BE PROVIDED TO THE OWNER AT THE COMPLETION OF THE WORK. THE CONTRACTOR SHALL DEMONSTRATE AND INSTRUCT THE OPERATION OF SYSTEMS TO THE OWNER'S REPRESENTATIVE.
2. ENSURE O & M MANUALS SHALL BE PROVIDED IN BOTH HARD-COPY AND PDF FORMAT ON DVD.
3. AT A MINIMUM, O & M MANUALS SHALL BE INTERNALLY SUBDIVIDED AND INCLUDE THE FOLLOWING.
   A. TABLE OF CONTENTS FOR EACH VOLUME, INCLUDING EMERGENCY CONTACT LISTS / INFORMATION
   B. PROJECT DIRECTORY, INCLUDING NAMES, ADDRESSES, AND TELEPHONE NUMBERS OF THE HVAC ENGINEER, CONTRACTOR, HAVC SUBCONTRACTOR, AND MAJOR EQUIPMENT SUPPLIERS.
   C. LISTING OF HVAC EQUIPMENT.
   D. PART LIST FOR EACH PIECE OF EQUIPMENT
   E. OPERATING INSTRUCTIONS
   F. VALVE CHARTS
   G. GAS-FIRED BURNER DATA (WHERE APPLICABLE)
   H. APPROVED SUBMITTAL DATA
   I. COPIES OF CERTIFICATES, WARRANTIES, AND GUARANTEES.
   J. TEST REPORTS

SYMBOLS

- (E) 12X10 — EXISTING DUCTWORK OR EQUIPMENT TO REMAIN
- (D) 12X10 — EXISTING DUCTWORK TO BE REMOVED
- 12X10 — NEW DUCT (1ST DIMENSION INDICATES TOP SHOWN, INSIDE CLEAR DIMENSIONS).
- DUCTWORK WITH SOUND LINING
- SD — SMOKE DAMPER
- M — MOTORIZED DAMPER
- FD — FIRE DAMPER
- EXHAUST DUCT TO RISE UP
- EXHAUST DUCT TO DROP DOWN
- RETURN DUCT TO DROP DOWN
- RETURN DUCT TO RISE UP
- SUPPLY DUCT TO DROP DOWN
- SUPPLY DUCT TO RISE UP
- SUPPLY AIR DEVICE
- DUCTWORK WITH TRANSITION
- ELBOW WITHOUT TURNING VANES
- BDD — RELIEF AIR LOUVER WITH BACKDRAFT DAMPER
- D — CONDENSATE DRAIN
- CD — CONDENSATE PIPING
- RL — REFRIGERANT LIQUID
- RS — REFRIGERANT SUCTION
- RS — REFRIGERANT GAS
- DTS — DUAL TEMPERATURE SUPPLY
- DTR — DUAL TEMPERATURE RETURN
- X / MXXX — DETAIL NUMBER / DETAIL SHEET NUMBER
- 1 — NEW/DEMOLITION KEYED DRAWING NOTE
- EQPM-## — EQUIPMENT DESIGNATION TAG
- 1 — REVISION NUMBER
- A-A / M-100 — SECTION NUMBER / SHEET NUMBER
- POINT OF NEW CONNECTION
- POINT OF DISCONNECTION

NOTE:
ALL SYMBOLS MAY NOT APPEAR ON THE DRAWINGS.

ABBREVIATIONS

AABC	ASSOCIATED AIR BALANCE COUNCIL
AC	AIR CONDITIONING UNIT
ACCU	AIR CONDITIONING CONDENSING UNIT
AF	AIR FILTER
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
AI	ANALOG INPUT
AMCA	AIR MOVEMENT AND CONTROL ASSOCIATION
AO	ANALOG OUTPUT
APD	AIR PRESSURE DROP
ARCH	ARCHITECTURAL
ATC	AUTO TEMPERATURE CONTROL
BD	BALANCING DAMPER
BDD	BACKDRAFT DAMPER
BHP	BRAKE HORSE POWER
BLDG	BUILDING
BLW	BELOW
BTUH	BRITISH THERMAL UNIT PER HOUR
CAC	CONTROL AIR COMPRESSOR
CAV	CONSTANT AIR VOLUME
CD	CONDENSATE DRAIN
CFM	CUBIC FEET PER MINUTE
CH	CHILLER
CHR	CHILLED WATER RETURN
CHS	CHILLED WATER SUPPLY
CLG	CEILING
CO	CLEAN OUT
CRAC	COMPUTER ROOM AIR CONDITIONING UNIT
CV	CONVERTER
CU	CONDENSING UNIT
(D)	DEMO
DB	DRY BULB
DDC	DIRECT DIGITAL CONTROL
DI	DIGITAL INPUT
DIA	DIAMETER
DN	DOWN
DO	DAMPER OPERATOR
DO	DIGITAL OUTPUT
DPS	DIFFERENTIAL PRESSURE SWITCH
DTS/R	DUAL TEMPERATURE SUPPLY/RETURN
DWEF	DISH WASHER EXHAUST FAN
DWG	DRAWING
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
ET	EXPANSION TANK
ETR	EXISTING TO REMAIN
ER	EXHAUST REGISTER
EXIST	EXISTING
(E)	EXISTING
EXT	EXTERNAL
EUH	ELECTRIC UNIT HEATER
F	FAHRENHEIT
FD	FIRE DAMPER
FL	FLOOR
FPM	FEET PER MINUTE
FT	FEET
FTR	FINNED TUBE RADIATOR
FZ	FREEZE STAT
GPM	GALLONS PER MINUTE
GWR	GLYCOL WATER RETURN
GWS	GLYCOL WATER SUPPLY
GV	GRAVITY VENTILATOR
HP	HORSE POWER/HEAT PUMP
HR	HOUR
HS	HUMIDITY SENSOR
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
IN	INCH
KEF	KITCHEN EXHAUST FAN
KW	KILOWATT
LAN	LOCAL AREA NETWORK
LAT	LEAVING AIR TEMPERATURE
LB	POUNDS
LF	LINEAR FEET
MAU	MAKEUP AIR UNIT
MAX	MAXIMUM
MBH	1000 BTUH
MECH	MECHANICAL
MIN	MINIMUM
MOCP	MAXIMUM OVERCURRENT PROTECTION
MTD	MOUNTED
NC	NOISE CRITERIA
NC	NORMALLY CLOSED
NIC	NETWORK INTERFACE CARD
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOM	NOMINAL
No.	NUMBER
OA	OUTSIDE AIR
OAT	OUTSIDE AIR TEMPERATURE
PS	PRESSURE SENSOR
PSI	POUNDS PER SQUARE INCH
R&R	REMOVE AND REINSTALL
RA	RETURN AIR
RAR	RETURN AIR REGISTER
RAT	RETURN AIR TEMPERATURE
RD	ROOF DRAIN
REF-HG	REFRIGERANT HOT GAS
REF-L	REFRIGERANT LIQUID
REF-S	REFRIGERANT SUCTION
RF	RETURN FAN
RLA	RELIEF AIR
RLF	RELIEF FAN
RPM	REVOLUTION PER MINUTE
RTU	ROOF TOP UNIT
SD	SMOKE DETECTOR
SF	SUPPLY FAN
SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION
SS	STAINLESS STEEL
ST	SOUND TRAP
TYP	TYPICAL
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
V	VENT
VFD/VSD	VARIABLE FREQUENCY /SPEED DRIVE
VRF	VARIABLE REFRIGERANT FLOW
W	WATT
WB	WET BULB
WC	WATER COLUMN
WPD	WATER PRESSURE DROP
W/	WITH
W/O	WITHOUT

NOTE:
ALL ABBREVIATIONS MAY NOT APPEAR ON THE DRAWINGS.

MECHANICAL DRAWING LIST

SHEET	DRAWING	TITLE
1	M-001	GENERAL NOTES, SYMBOLS & ABBREVIATIONS
2	MD-100	THIRD FLOOR PLAN - MECHANICAL DEMOLITION
3	MD-101	ROOF PLAN - MECHANICAL DEMOLITION AREA A1
4	MD-102	ROOF PLAN - MECHANICAL DEMOLITION AREA A2
5	M-100	THIRD FLOOR PLAN - MECHANICAL NEW WORK
6	M-101	ROOF PLAN - MECHANICAL DUCTWORK AREA A1
7	M-102	ROOF PLAN - MECHANICAL DUCTWORK AREA A2
8	M-701	MECHANICAL DETAILS

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REVISIONS		
DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/29/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · MICHAEL A. LENTZ · No. 36396 · PROFESSIONAL ENGINEER
12/29/2023

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland.
License No. 36396, Expiration Date 11/24/2024

SHEET TITLE
GENERAL NOTES, SYMBOLS & ABBREVIATIONS

DRAWN BY	CHECKED BY	SHEET NO
DS	VK	M-001

SET DESCRIPTION: 100% CONSTRUCTION DOCUMENTS
DATE: 12/29/2023

M SHEET 01 OF 08

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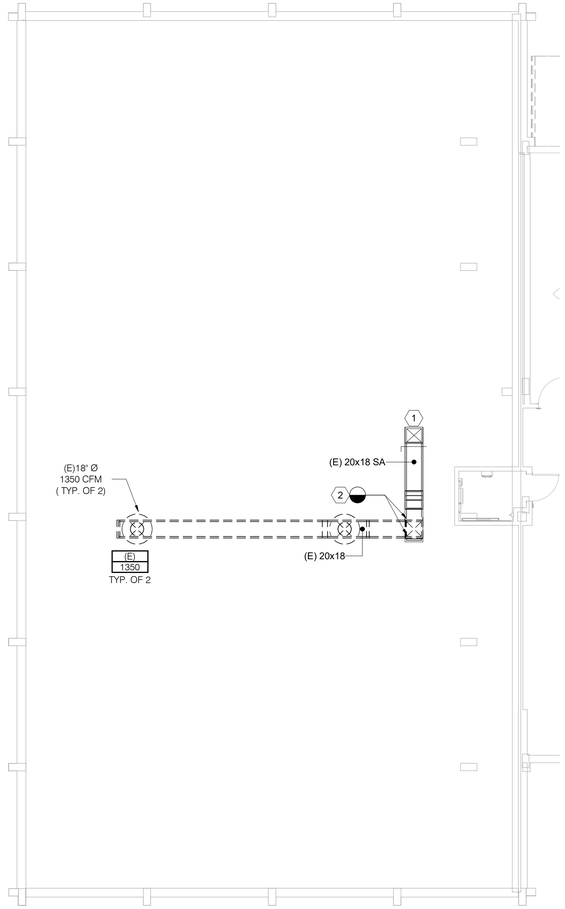
THIS SHEET IS 30" X 42" AT FULL SIZE.

STAPLE EDGE



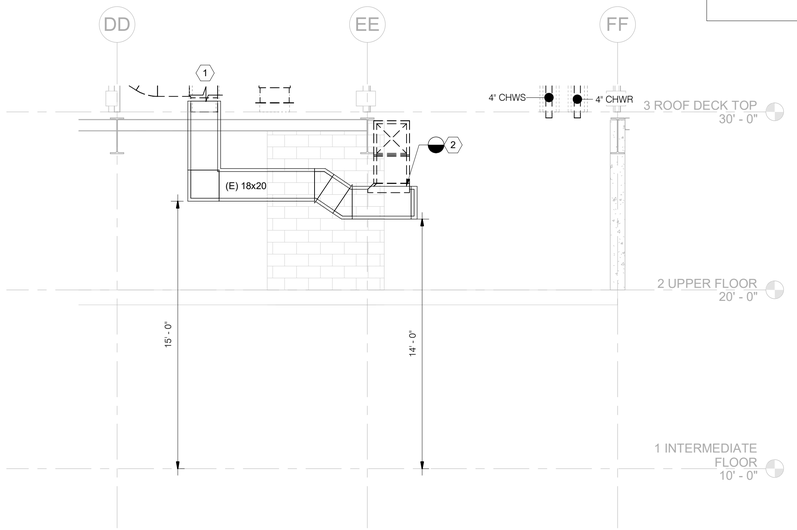
1 MD-100 THIRD FLOOR PLAN - MECHANICAL DEMOLITION
1/8" = 1'-0"
0 4' 8' 16'

SHEET KEY NOTES

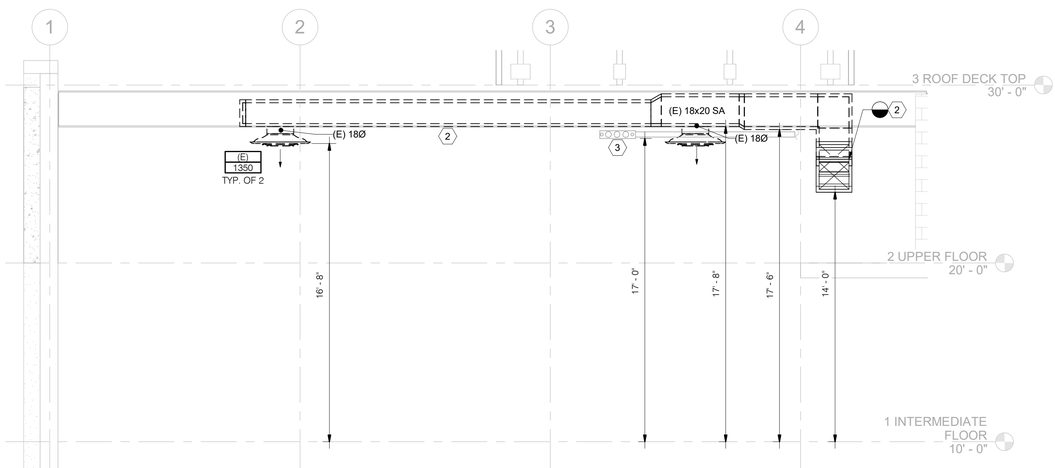
1. EXISTING 20x18 DUCT UP AND CONNECT TO RTU-2 ON ROOF.
2. DISCONNECT AND REMOVE EXISTING INSULATED DUCTWORK AND ASSOCIATED SUPPORTS, DIFFUSERS, ETC. TEMPORARILY. CONTRACTOR IS RESPONSIBLE TO PROTECT AND STORE WITHOUT ANY DAMAGE TO RESTORE.
3. EXISTING ELECTRICAL PULL BOX AND CONDUIT.

GENERAL NOTES

1. EXISTING WORK SHOWN IS BASED ON AVAILABLE DOCUMENTATION AND SPOT CHECKS ON SURVEY. CONTRACTOR TO FIELD VERIFY EXISTING CONDITIONS AND COORDINATE WITH ENGINEER PRIOR TO PROCEEDING WITH WORK.
2. THE DEMOLITION PLAN IS NOT INCLUSIVE OF ALL HVAC DEVICES WITHIN THE PROJECT AREA. IT IS INTENDED TO PROVIDE THE CONTRACTOR WITH A GENERAL KNOWLEDGE OF THE EXISTING CONDITIONS WITHIN THE PROJECT AREA. ANY DISCREPANCIES OR CONDITIONS NOT SHOWN ON THIS PLAN SHALL BE COORDINATED.
3. CONTRACTOR TO FIELD COORDINATE ALL REMOVAL/STORAGE/ DISPOSAL OF EXISTING EQUIPMENT WITH THE OWNERS.
4. ALL WORK SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES, SAFETY REGULATIONS AND OWNER'S REQUIREMENTS.
5. CONTRACTOR SHALL SCHEDULE ALL WORK IN ACCORDANCE WITH OWNER'S REQUIREMENTS.
6. CONTRACTOR TO ENSURE ALL OPENINGS TO BE TEMPORARILY CAPPED AND WEATHER PROTECTED DURING CONSTRUCTION PHASE.
7. CONTRACTOR TO ENSURE ALL EXISTING EQUIPMENT IS IN WORKING CONDITION PRIOR TO START OF WORK.
8. CONTRACTOR TO PERFORM PRE-DEMOLITION TAB PRIOR TO THE REMOVAL OF EXISTING EQUIPMENT.

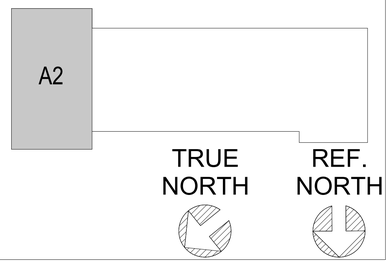


3 MD-100 SECTIONAL VIEW - 2
1/4" = 1'-0"
0 4' 8' 16'



2 MD-100 SECTIONAL VIEW - 1
1/4" = 1'-0"
0 4' 8' 16'

KEY PLAN



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SHEET TITLE
THIRD FLOOR PLAN - MECHANICAL DEMOLITION

DRAWN BY	CHECKED BY	SHEET NO
DS	VK	MD-100

SET DESCRIPTION
100% CONSTRUCTION DOCUMENTS

DATE
12/29/2023

M SHEET 02 OF 08

THIS SHEET IS 30" X 42" AT FULL SIZE

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STAPLE EDGE

1 2 3 4

D

C

B

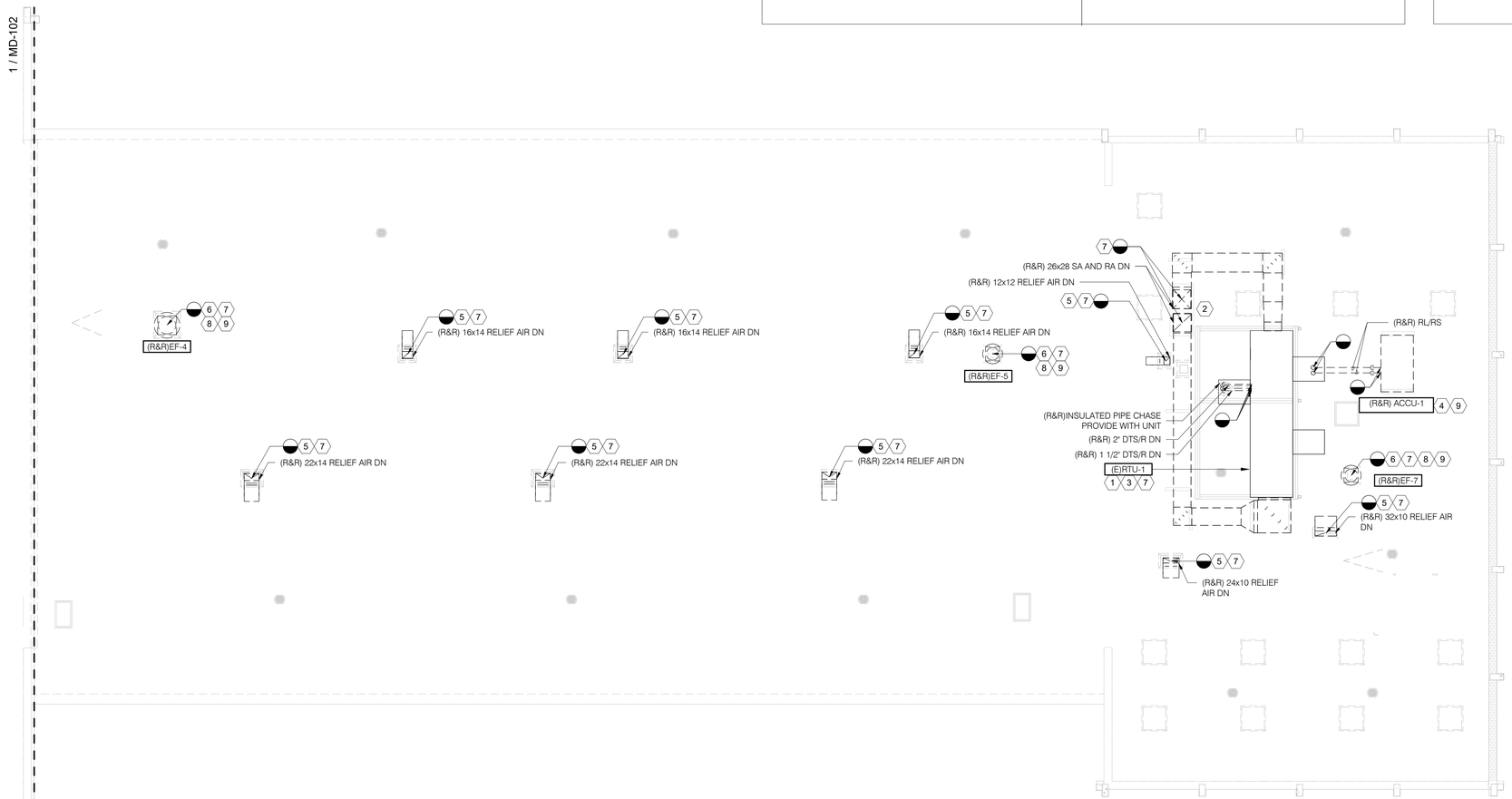
A

SHEET KEY NOTES

1. EXISTING ROOF TOP UNIT ALONG WITH IT'S STRUCTURAL SUPPORT TO REMAIN. CONTRACTOR IS RESPONSIBLE TO PROTECT THE UNIT DURING CONSTRUCTION. DISCONNECT ALL ASSOCIATED PIPING, DUCTWORK, CONTROLS ETC IF NECESSARY TO ALLOW REROOFING. (TYPICAL.)
2. DEMOLISH AND REMOVE EXISTING DUCT PENETRATION ROOF CURB.
3. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR INFORMATION ON EQUIPMENT SUPPORTS/DUNNAGE AND ROOF PENETRATION DETAILS. CONTRACTOR TO FIELD VERIFY AND COORDINATE WITH STRUCTURAL ENGINEER/ARCHITECT.
4. DISCONNECT AND REMOVE EXISTING CONDENSING UNIT. CONTRACTOR IS RESPONSIBLE TO PROTECT AND STORE THE UNIT WITHOUT ANY DAMAGE TO RESTORE. PRIOR TO UNIT REMOVAL DISCONNECT ALL EXISTING REFRIGERANT PIPING CONNECTIONS, CONTROLS. CONTRACTOR TO ENSURE SAFE COLLECTION OF REFRIGERANT PER EPA. DEMOLISH AND REMOVE EXISTING CONDENSING UNIT SUPPORT.
5. DISCONNECT AND REMOVE EXISTING GOOSENECK CONNECTION. CONTRACTOR IS RESPONSIBLE TO PROTECT AND STORE WITHOUT ANY DAMAGE TO RESTORE.
6. DISCONNECT AND REMOVE EXISTING EXHAUST FAN AND IT'S SUPPORT. CONTRACTOR IS RESPONSIBLE TO PROTECT AND STORE THE UNIT WITHOUT ANY DAMAGE TO RESTORE. DISCONNECT ALL ASSOCIATED DUCTWORK, CONTROLS ETC. (TYPICAL.)
7. ALL EXISTING DUCTWORK / RISER CONNECTED TO EXISTING EXHAUST FAN / GOOSENECK SHALL REMAIN IN PLACE. CONTRACTOR TO ENSURE ALL OPENINGS TO BE TEMPORARILY CAPPED AND WEATHER PROTECTED DURING CONSTRUCTION PHASE.
8. ELECTRICAL CONTRACTOR TO DISCONNECT POWER TO EQUIPMENT BEING REMOVED TEMPORARILY. ASSOCIATED OVERCURRENT PROTECTION EQUIPMENT AND OTHER ELECTRICAL COMPONENTS TO REMAIN AND CAP EXISTING WIRING FOR RECONNECTION. SEE SHEET M101 FOR NEW ELECTRICAL WORK.(TYPICAL)
9. CONTRACTOR TO PERFORM TEST AND PROVIDE PRE-REMOVAL BALANCING REPORT TO THE OWNER PRIOR TO REMOVAL OF ALL EQUIPMENT THAT ARE BEING DEMOLISHED, REMOVED AND REINSTALLED. (TYPICAL.)

GENERAL NOTES

1. EXISTING WORK SHOWN IS BASED ON AVAILABLE DOCUMENTATION AND SPOT CHECKS ON SURVEY. CONTRACTOR TO FIELD VERIFY EXISTING CONDITIONS AND COORDINATE WITH ENGINEER PRIOR TO PROCEEDING WITH WORK.
2. THE DEMOLITION PLAN IS NOT INCLUSIVE OF ALL HVAC DEVICES WITHIN THE PROJECT AREA. IT IS INTENDED TO PROVIDE THE CONTRACTOR WITH A GENERAL KNOWLEDGE OF THE EXISTING CONDITIONS WITHIN THE PROJECT AREA. ANY DISCREPANCIES OR CONDITIONS NOT SHOWN ON THIS PLAN SHALL BE COORDINATED.
3. CONTRACTOR TO FIELD COORDINATE ALL REMOVAL/STORAGE/ DISPOSAL OF EXISTING EQUIPMENT WITH THE OWNERS.
4. ALL WORK SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES, SAFETY REGULATIONS AND OWNER'S REQUIREMENTS.
5. CONTRACTOR SHALL SCHEDULE ALL WORK IN ACCORDANCE WITH OWNER'S REQUIREMENTS.
6. CONTRACTOR TO ENSURE ALL OPENINGS TO BE TEMPORARILY CAPPED AND WEATHER PROTECTED DURING CONSTRUCTION PHASE.
7. CONTRACTOR TO ENSURE ALL EXISTING EQUIPMENT IS IN WORKING CONDITION PRIOR TO START OF WORK.
8. CONTRACTOR TO PERFORM PRE-DEMOLITION TAB PRIOR TO THE REMOVAL OF EXISTING EQUIPMENT.



1 MD-101 ROOF PLAN - MECHANICAL DEMOLITION AREA A1
1/8" = 1'-0"
0 4' 8' 16'

KEY PLAN

MICHAEL GRAVES

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NATIONAL HARBOR, MD 20745
301-203-1784

REVISIONS		
DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/29/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · MICHAEL A. LEUTERIO · NO. 36396 · PROFESSIONAL ENGINEER
12/29/2023

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland.
License No. 36396, Expiration Date 11/24/2024

SHEET TITLE
ROOF PLAN - MECHANICAL DEMOLITION AREA A1

DRAWN BY	CHECKED BY	SHEET NO
DS	VK	MD-101

SET DESCRIPTION
100% CONSTRUCTION DOCUMENTS

DATE
12/29/2023

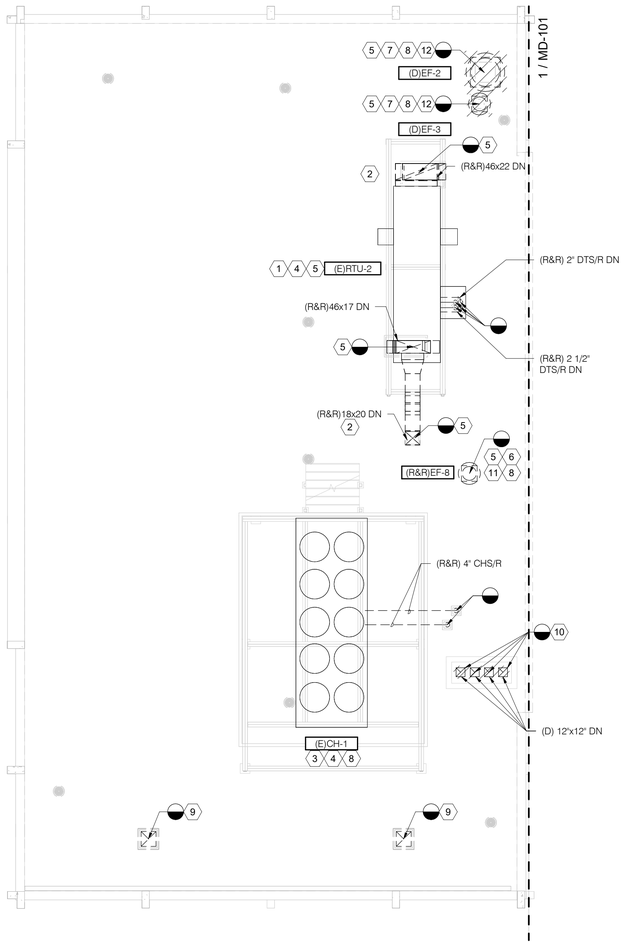
STAPLE EDGE

SHEET KEY NOTES

1. EXISTING ROOF TOP UNIT ALONG WITH IT'S STRUCTURAL SUPPORT TO REMAIN. CONTRACTOR IS RESPONSIBLE TO PROTECT THE UNIT DURING CONSTRUCTION. DISCONNECT ALL ASSOCIATED PIPING, DUCTWORK, CONTROLS ETC IF NECESSARY TO ALLOW REROOFING. (TYPICAL.)
2. DEMOLISH AND REMOVE EXISTING DUCT PENETRATION ROOF CURB.
3. EXISTING AIR COOLED CHILLER AND ASSOCIATED STRUCTURAL SUPPORT TO REMAIN. CONTRACTOR IS RESPONSIBLE TO PROTECT THE UNIT DURING CONSTRUCTION. DISCONNECT ALL ASSOCIATED PIPING, CONTROLS ETC IF NECESSARY TO ALLOW REROOFING.
4. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR INFORMATION ON EQUIPMENT SUPPORTS/DUNNAGE AND ROOF PENETRATION DETAILS. CONTRACTOR TO FIELD VERIFY AND COORDINATE WITH STRUCTURAL ENGINEER/ARCHITECT.
5. ALL EXISTING DUCTWORK / RISER CONNECTED TO EXISTING EXHAUST FAN / GOOSENECK SHALL REMAIN IN PLACE. CONTRACTOR TO ENSURE ALL OPENINGS TO BE TEMPORARILY CAPPED AND WEATHER PROTECTED DURING CONSTRUCTION PHASE.
6. DISCONNECT AND REMOVE EXISTING EXHAUST FAN AND IT'S SUPPORT. CONTRACTOR IS RESPONSIBLE TO PROTECT AND STORE THE UNIT WITHOUT ANY DAMAGE TO RESTORE. DISCONNECT ALL ASSOCIATED DUCTWORK, CONTROLS ETC. (TYPICAL.)
7. DEMOLISH AND REMOVE EXISTING EXHAUST FAN AND ROOF CURB. DISCONNECT ALL ASSOCIATED DUCTWORK, CONTROLS, ELECTRICAL WIRING ETC. (TYPICAL.)
8. CONTRACTOR TO PERFORM TEST AND PROVIDE PRE-REMOVAL BALANCING REPORT TO THE OWNER PRIOR TO REMOVAL OF ALL EQUIPMENT THAT ARE BEING DEMOLISHED, REMOVED AND REINSTALLED. (TYPICAL.)
9. REMOVE ALL EXISTING ABANDONED ROOF CURB ALONG WITH ASSOCIATED INTERIOR DUCTWORK IF THEY EXIST. CONTRACTOR TO FIELD VERIFY. (TYPICAL)
10. DEMOLISH AND REMOVE EXISTING BOILER AND HEATER STACKS.
11. ELECTRICAL CONTRACTOR TO DISCONNECT POWER TO EQUIPMENT BEING REMOVED TEMPORARILY. ASSOCIATED OVERCURRENT PROTECTION EQUIPMENT TO REMAIN AND CAP EXISTING WIRING FOR RECONNECTION. (TYPICAL.)
12. ELECTRICAL CONTRACTOR TO DISCONNECT POWER TO EQUIPMENT BEING REMOVED AND CAP EXISTING WIRING FOR RECONNECTION TO NEW MECHANICAL UNIT. ASSOCIATED OVERCURRENT PROTECTION AND OTHER ELECTRICAL COMPONENTS TO REMAIN. SEE SHEET M102 FOR NEW ELECTRICAL WORK.

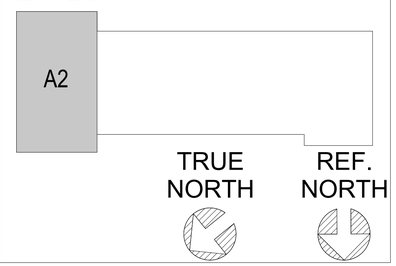
GENERAL NOTES

1. EXISTING WORK SHOWN IS BASED ON AVAILABLE DOCUMENTATION AND SPOT CHECKS ON SURVEY. CONTRACTOR TO FIELD VERIFY EXISTING CONDITIONS AND COORDINATE WITH ENGINEER PRIOR TO PROCEEDING WITH WORK.
2. THE DEMOLITION PLAN IS NOT INCLUSIVE OF ALL HVAC DEVICES WITHIN THE PROJECT AREA. IT IS INTENDED TO PROVIDE THE CONTRACTOR WITH A GENERAL KNOWLEDGE OF THE EXISTING CONDITIONS WITHIN THE PROJECT AREA. ANY DISCREPANCIES OR CONDITIONS NOT SHOWN ON THIS PLAN SHALL BE COORDINATED.
3. CONTRACTOR TO FIELD COORDINATE ALL REMOVAL/STORAGE/ DISPOSAL OF EXISTING EQUIPMENT WITH THE OWNERS.
4. ALL WORK SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES, SAFETY REGULATIONS AND OWNER'S REQUIREMENTS.
5. CONTRACTOR SHALL SCHEDULE ALL WORK IN ACCORDANCE WITH OWNER'S REQUIREMENTS.
6. CONTRACTOR TO ENSURE ALL OPENINGS TO BE TEMPORARILY CAPPED AND WEATHER PROTECTED DURING CONSTRUCTION PHASE.
7. CONTRACTOR TO ENSURE ALL EXISTING EQUIPMENT IS IN WORKING CONDITION PRIOR TO START OF WORK.
8. CONTRACTOR TO PERFORM PRE-DEMOLITION TAB PRIOR TO THE REMOVAL OF EXISTING EQUIPMENT.



1 MD-102 ROOF PLAN - MECHANICAL DEMOLITION AREA A2
1/8" = 1'-0"
0 4' 8' 16'

KEY PLAN



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PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · MICHAEL A. VINES · No. 36396 · PROFESSIONAL ENGINEER
12/29/2023

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland.
License No. 36396, Expiration Date 11/24/2024

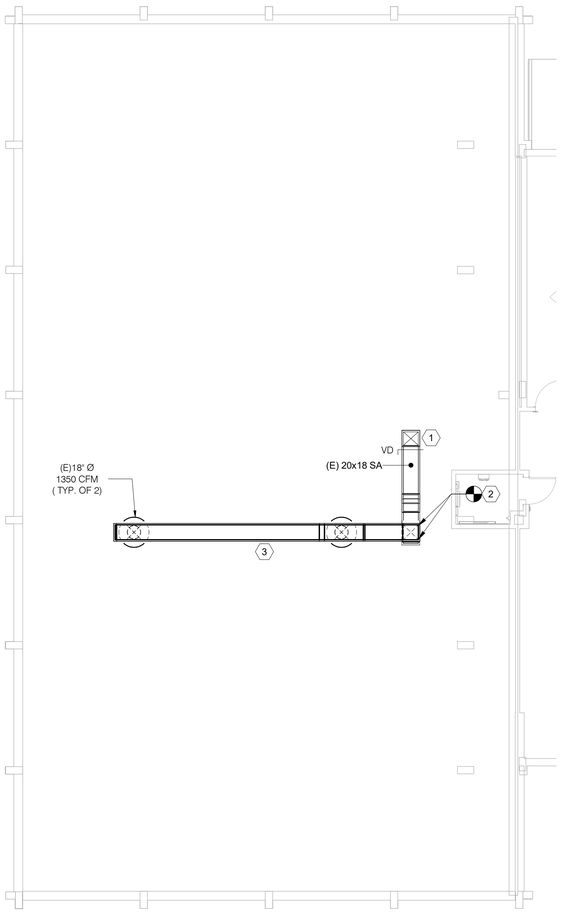
SHEET TITLE
ROOF PLAN - MECHANICAL DEMOLITION AREA A2

DRAWN BY	CHECKED BY	SHEET NO
DS	VK	MD-102

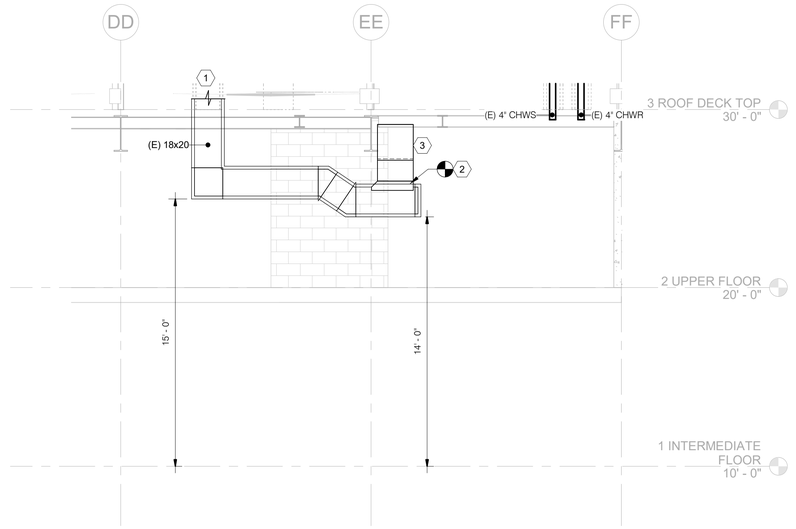
SET DESCRIPTION: 100% CONSTRUCTION DOCUMENTS
DATE: 12/29/2023

M SHEET 04 OF 08

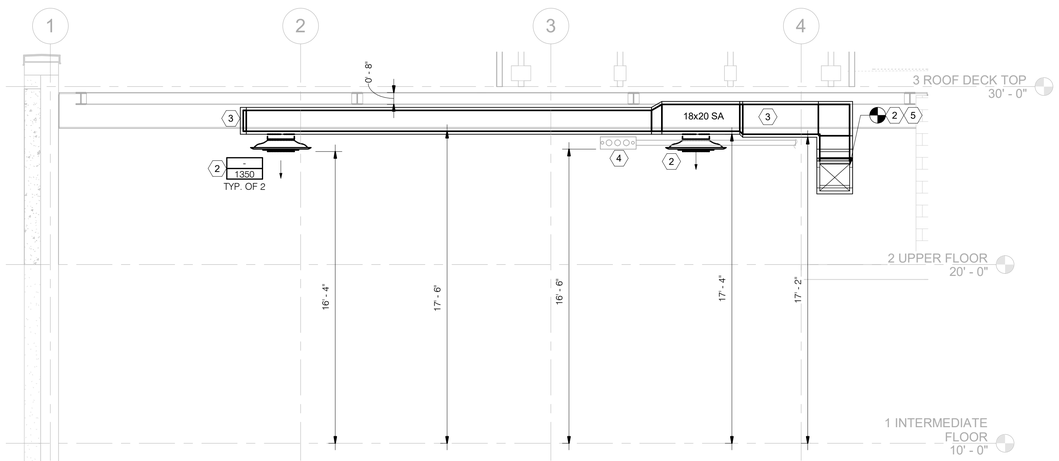
STAPLE EDGE



3 M-100 THIRD FLOOR PLAN - MECHANICAL NEW WORK
1/8" = 1'-0"
0 4' 8' 16'



2 M-100 SECTIONAL VIEW - 2 NEW
1/4" = 1'-0"
0 4' 8' 16'



1 M-100 SECTIONAL VIEW - 1 NEW
1/4" = 1'-0"
0 4' 8' 16'

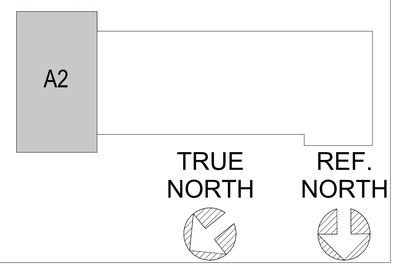
SHEET KEY NOTES

1. EXISTING 20x18 DUCT UP AND CONNECT TO RTU-2 ON ROOF.
2. CONTRACTOR TO REINSTALL AND RECONNECT EXISTING DUCTWORK AND DIFFUSERS WITH NECESSARY NEW SUPPORT TO MATCH EXISTING. CONTRACTOR TO ENSURE PROPER CONNECTION AND OPERATION.
3. CONTRACTOR TO LOWER THE EXISTING INSULATED DUCTWORK TO ALLOW SPACE TO INSTALL NEW STRUCTURAL BEAM. REFER TO STRUCTURAL DRAWINGS FOR DETAILS. CONTRACTOR TO FIELD VERIFY AND ENSURE CLASH-FREE INSTALLATION.
4. ELECTRICAL PULL BOX AND CONDUITS TO BE LOWERED AS NECESSARY TO RESOLVE ANY CLASH. OTHERWISE, SHALL REMAIN IN PLACE. FIELD COORDINATE WITH ELECTRICAL CONTRACTOR AS REQUIRED.
5. CONTRACTOR TO PROVIDE ADDITIONAL SUPPORTS AND TRANSITIONS REQUIRED TO DUCTWORK IF NECESSARY.

GENERAL NOTES

1. CONTRACTOR SHALL SCHEDULE ALL WORK IN ACCORDANCE WITH OWNER'S REQUIREMENTS.
2. COORDINATE ALL MECHANICAL WORK TO BE INSTALLED WITH ALL OTHER TRADES I.E. ARCH, STRUC, ELECTRICAL, PLUMBING, SPRINKLER, ETC. PRIOR TO THE START OF ALL TRADES INSTALLATION WORK.
3. ALL WORK SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES AND SAFETY REGULATIONS.
4. CONTRACTOR TO INSTALL ALL EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION AND CODE REQUIREMENT.
5. CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LOCATIONS, AND CLEARANCES PRIOR TO START OF CONSTRUCTION.
6. CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL NECESSARY DUCTWORK CONNECTIONS AS REQUIRED.
7. ALL SYSTEM INSTALLED OR REINSTALLED SHALL BE TESTED AND BALANCED TO OPERATE AS EXISTING CONDITION.
8. CONTRACTOR IS RESPONSIBLE FOR PROVIDING MINIMUM 24" NEW ROOF CURB TO ALL THE UNITS/DUCTWORK AS REQUIRED.

KEY PLAN



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NATIONAL HARBOR, MD 20745
301-203-1784

REVISIONS		
DATE	NO.	ISSUED FOR
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12/29/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · VISHWAS A. KUMAR · No. 36396 · PROFESSIONAL ENGINEER
12/29/2023

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland.
License No. 36396, Expiration Date 11/24/2024

SHEET TITLE
THIRD FLOOR PLAN - MECHANICAL NEW WORK

DRAWN BY	CHECKED BY	SHEET NO
DS	VK	M-100

SET DESCRIPTION: 100% CONSTRUCTION DOCUMENTS
DATE: 12/29/2023

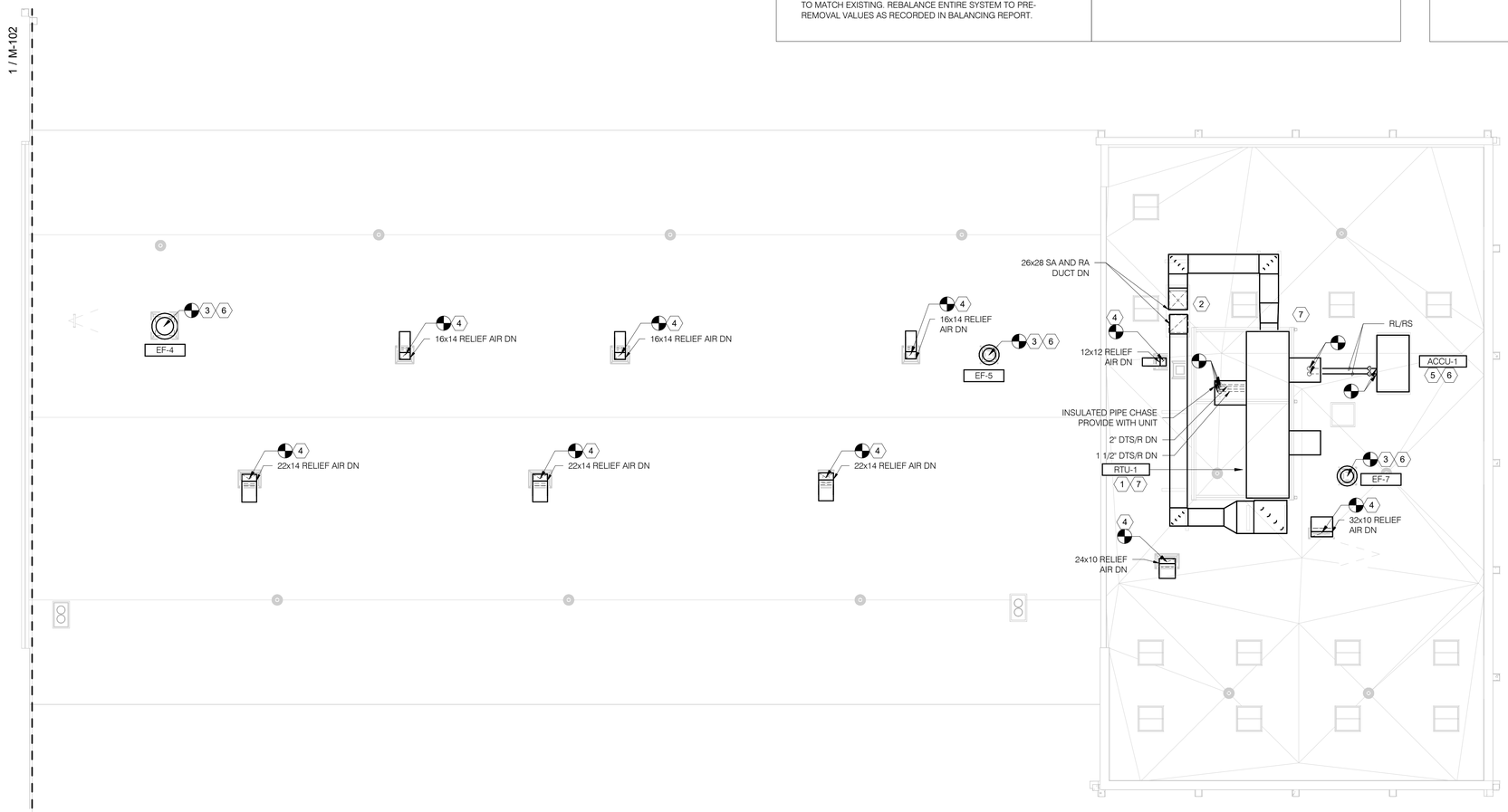
STAPLE EDGE

SHEET KEY NOTES

1. RECONNECT ALL EXISTING CONTROLS, DUCT WORK TO ROOF TOP UNIT. EXTEND CONTROLS WIRING AND DUCTWORK WITH NEW AS NECESSARY. CONTRACTOR TO SERVICE UNIT AND ENSURE PROPER OPERATION.
2. PROVIDE NEW DUCT ROOF PENETRATION CURB TO MATCH EXISTING.
3. REINSTALL EXISTING ROOF EXHAUST FAN WITH NEW ROOF CURB. RECONNECT ALL EXISTING CONTROLS, EXHAUST DUCT RISER TO FAN. EXTEND CONTROLS WIRING AND DUCTWORK WITH NEW AS NECESSARY. SEQUENCE OF OPERATION SHALL MATCH THE EXISTING. REBALANCE ENTIRE SYSTEM TO PRE-REMOVAL AIRFLOW VALUES AS RECORDED IN BALANCING REPORT.
4. REINSTALL EXISTING GOOSENECK WITH NEW ROOF CURB. RECONNECT EXISTING DUCTWORK TO THE GOOSENECK. EXTEND DUCTWORK AS REQUIRED. CONTRACTOR TO FIELD VERIFY. REFER TO DWG. M701 FOR GOOSENECK INSTALLATION DETAIL.
5. REINSTALL EXISTING CONDENSING UNIT ON ROOF WITH NEW SUPPORT AND ROOF CURB. RECONNECT ALL EXISTING CONTROLS, REFRIGERANT PIPING, ETC. CONTRACTOR TO CLEAN AND SERVICE EXISTING CONDENSING UNIT, FAN, MOTOR, CONTROLS ETC FOR PROPER OPERATION. REFRIGERANT TO BE RECHARGED PER MANUFACTURER'S GUIDELINES. (TYPICAL). PROVIDE NEW INSULATION WITH WEATHER PROOF JACKETING AND UV PROTECTION FOR ALL EXPOSED REFRIGERANT PIPING IF IT'S IN DAMAGED CONDITION. INSULATION THICKNESS AND TYPE TO MATCH EXISTING. REBALANCE ENTIRE SYSTEM TO PRE-REMOVAL VALUES AS RECORDED IN BALANCING REPORT.
6. ELECTRICAL CONTRACTOR TO RECONNECT POWER INCLUDING ALL ASSOCIATED WIRING TO EQUIPMENT BEING REINSTALLED.
7. SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR INFORMATION ON EQUIPMENT SUPPORTS/DUNNIAGE AND ROOF PENETRATIONS. CONTRACTOR TO FIELD VERIFY AND COORDINATE WITH STRUCTURAL ENGINEER/ARCHITECT.

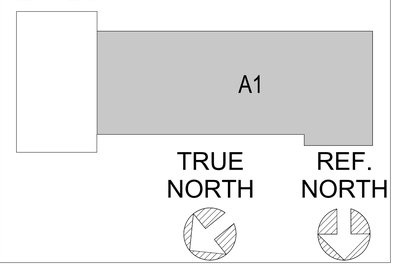
GENERAL NOTES

1. CONTRACTOR SHALL SCHEDULE ALL WORK IN ACCORDANCE WITH OWNER'S REQUIREMENTS.
2. COORDINATE ALL MECHANICAL WORK TO BE INSTALLED WITH ALL OTHER TRADES I.E. ARCH, STRUC, ELECTRICAL, PLUMBING, SPRINKLER, ETC. PRIOR TO THE START OF ALL TRADES INSTALLATION WORK.
3. ALL WORK SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES AND SAFETY REGULATIONS.
4. CONTRACTOR TO INSTALL ALL EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION AND CODE REQUIREMENT.
5. CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LOCATIONS, AND CLEARANCES PRIOR TO START OF CONSTRUCTION.
6. CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL NECESSARY DUCTWORK CONNECTIONS AS REQUIRED.
7. ALL SYSTEM INSTALLED OR REINSTALLED SHALL BE TESTED AND BALANCED TO OPERATE AS EXISTING CONDITION.
8. CONTRACTOR IS RESPONSIBLE FOR PROVIDING MINIMUM 24" NEW ROOF CURB TO ALL THE UNITS/DUCTWORK AS REQUIRED.



1 / M-101 ROOF PLAN - MECHANICAL DUCTWORK AREA A1
1/8" = 1'-0"
0 4' 8' 16'

KEY PLAN



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STATE OF MARYLAND · VIKRAM KUMAR · No. 36396 · PROFESSIONAL ENGINEER
12/29/2023

PROFESSIONAL CERTIFICATION
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SHEET TITLE
ROOF PLAN - MECHANICAL DUCTWORK AREA A1

DRAWN BY	CHECKED BY	SHEET NO
DS	VK	M-101

SET DESCRIPTION: 100% CONSTRUCTION DOCUMENTS
DATE: 12/29/2023

STAPLE EDGE

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A

SHEET KEY NOTES

1. RECONNECT ALL EXISTING CONTROLS, DUCT WORK TO ROOF TOP UNIT. EXTEND CONTROLS WIRING AND DUCTWORK WITH NEW AS NECESSARY. CONTRACTOR TO SERVICE UNIT AND ENSURE PROPER OPERATION.
2. PROVIDE NEW DUCT ROOF PENETRATION CURB TO MATCH EXISTING.
3. RECONNECT ALL EXISTING PIPING, CONTROLS, ETC TO AIR COOLED CHILLER. EXTEND CONTROLS WIRING AND PIPING WITH NEW AS NECESSARY. CONTRACTOR TO SERVICE UNIT AND ENSURE PROPER OPERATION.
4. PROVIDE NEW ROOF EXHAUST FAN IN KIND. SIZE AND CAPACITIES TO MATCH EXISTING. MOUNT NEW FAN ON 24" FACTORY SUPPLIED ROOF CURB. RECONNECT ALL EXISTING CONTROLS, ELECTRICAL WIRING AND EXHAUST DUCT RISER TO NEW EXHAUST FAN. EXTEND CONTROLS WIRING AND DUCTWORK AS NECESSARY. SEQUENCE OF OPERATION SHALL MATCH THE EXISTING. REBALANCE ENTIRE EXHAUST SYSTEM TO PRE-REMOVAL AIRFLOW VALUES AS RECORDED IN BALANCING REPORT. REFER TO DWG. M701 FOR EXHAUST FAN INSTALLATION DETAIL.
5. REINSTALL EXISTING ROOF EXHAUST FAN WITH NEW ROOF CURB. RECONNECT ALL EXISTING CONTROLS, EXHAUST DUCT RISER TO FAN. EXTEND CONTROLS WIRING AND DUCTWORK WITH NEW AS NECESSARY. SEQUENCE OF OPERATION SHALL MATCH THE EXISTING. REBALANCE ENTIRE SYSTEM TO PRE-REMOVAL AIRFLOW VALUES AS RECORDED IN BALANCING REPORT.
6. SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR INFORMATION ON EQUIPMENT SUPPORTS/DUNNAGE AND ROOF PENETRATIONS. CONTRACTOR TO FILED VERIFY AND COORDINATE WITH STRUCTURAL ENGINEER/ARCHITECT.
7. PROVIDE NEW BOILER AND HEATER STACKS. SIZE, TYPE AND INSTALLATION TO MATCH EXISTING.
8. ELECTRICAL CONTRACTOR TO RECONNECT POWER INCLUDING ALL ASSOCIATED WIRING TO EQUIPMENT BEING REINSTALLED.
9. ELECTRICAL CONTRACTOR TO CONNECT EXISTING FEEDER PREVIOUSLY SERVING EQUIPMENT BEING REMOVED TO NEW EQUIPMENT BEING INSTALLED. EXTEND EXISTING FEEDER AS NECESSARY. COORDINATE POWER REQUIREMENT FOR NEW EQUIPMENT AND ENSURE REQUIRED POWER CONNECTION IS THE SAME AS EQUIPMENT BEING REMOVED PRIOR TO ANY NEW WORK.

GENERAL NOTES

1. CONTRACTOR SHALL SCHEDULE ALL WORK IN ACCORDANCE WITH OWNER'S REQUIREMENTS.
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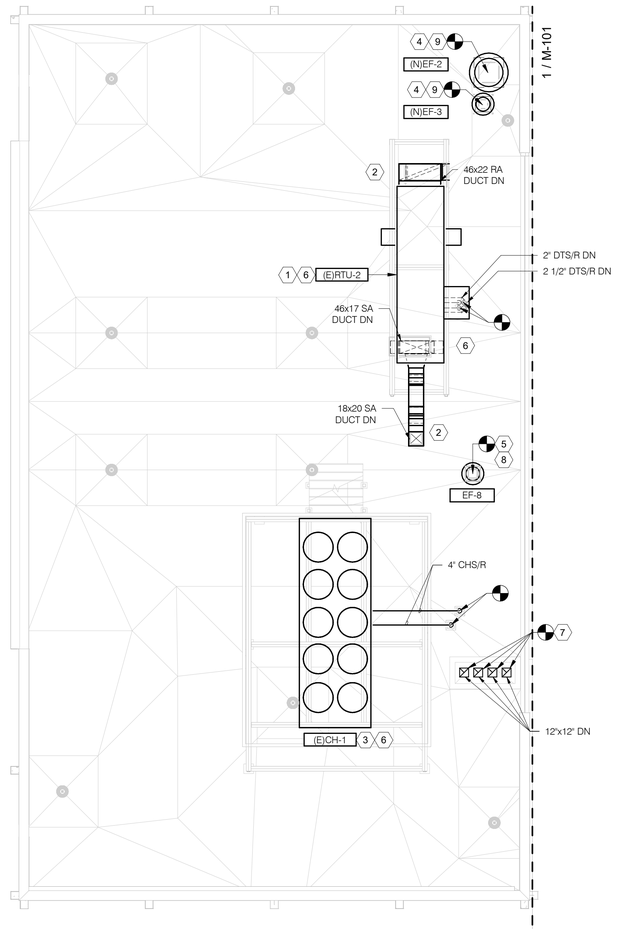
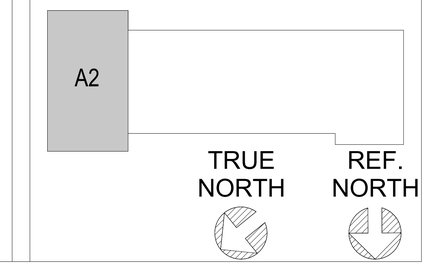
8. CONTRACTOR IS RESPONSIBLE FOR PROVIDING MINIMUM 24" NEW ROOF CURB TO ALL THE UNITS/DUCTWORK AS REQUIRED.



1 / M-102 ROOF PLAN - MECHANICAL DUCTWORK AREA A2
1/8" = 1'-0"
0 4' 8' 16'

KEY PLAN



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REVISIONS		
DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/29/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · MICHAEL A. LEUTERIO · No. 36396 · PROFESSIONAL ENGINEER
12/29/2023

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland.
License No. 36396, Expiration Date 11/24/2024

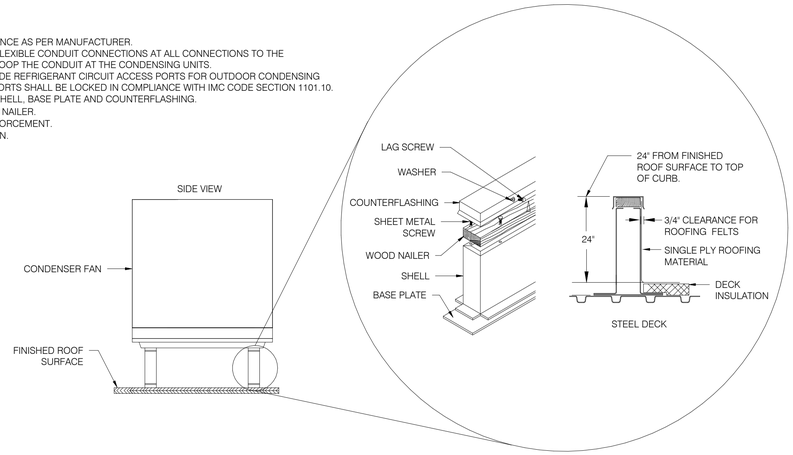
SHEET TITLE
ROOF PLAN - MECHANICAL DUCTWORK AREA A2

DRAWN BY	CHECKED BY	SHEET NO
DS	VK	M-102

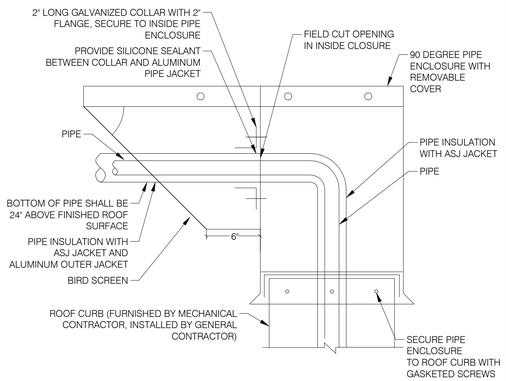
SET DESCRIPTION: 100% CONSTRUCTION DOCUMENTS
DATE: 12/29/2023

NOTES:

1. MAINTAIN MINIMUM CLEARANCE AS PER MANUFACTURER.
2. CONTRACTOR TO INSTALL FLEXIBLE CONDUIT CONNECTIONS AT ALL CONNECTIONS TO THE CONDENSING UNITS, AND LOOP THE CONDUIT AT THE CONDENSING UNITS.
3. CONTRACTOR SHALL PROVIDE REFRIGERANT CIRCUIT ACCESS PORTS FOR OUTDOOR CONDENSING UNITS ON ROOF. ACCESS PORTS SHALL BE LOCKED IN COMPLIANCE WITH IMC CODE SECTION 1101.10.
4. 18 GA. GALVANIZED STEEL SHELL, BASE PLATE AND COUNTERFLASHING.
5. FACTORY INSTALLED WOOD NAILER.
6. INTERNAL BULKHEAD REINFORCEMENT.
7. ALL WELDED CONSTRUCTION.

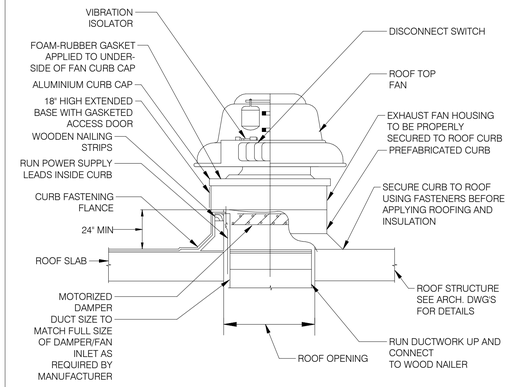


6 M-701 TYPICAL CONDENSING UNIT DETAIL
NO SCALE



NOTE:
ROOF PIPE ENCLOSURE ASSEMBLY SHALL HAVE WARRANTY PERIOD OF 20 YEARS FROM DATE OF FINAL ACCEPTANCE.

4 M-701 ROOF PIPE ENCLOSURE DETAIL
NO SCALE



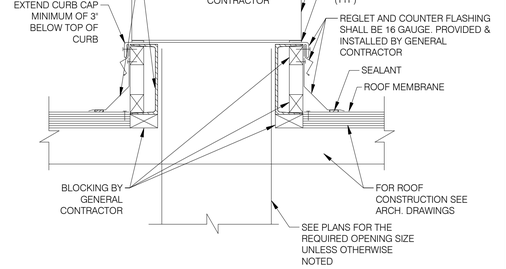
NOTE :
IF FAN AIRFLOW IS LESS THAN 300 CFM, BACKDRAFT SHALL BE PROVIDED INSTEAD OF MOTORIZED DAMPER

1 M-701 CENTRIFUGAL DOWNBLAST FAN (FLAT ROOF) DETAIL
NO SCALE

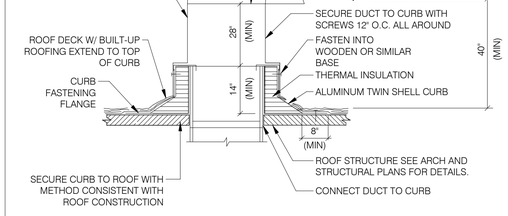
EXISTING FAN SCHEDULE (FOR REFERENCE ONLY)

UNIT TAG	LOCATION	SERVICE	TYPE	SIZE OR WHEEL DIA	CFM	S.P	MAX H.P	REMARKS
EF-2	MULTI-PURPOSE ROOM ROOF	RANGE HOOD EXHAUST	B	LB-252	3200	0.30	3/4	SEE NOTES
EF-3	MULTI-PURPOSE ROOM ROOF	DISHWASHER HOOD EXHAUST	C	AQ-10	800	0.24	1/6	SEE NOTES
EF-4	MAIN ROOF	MAIN TOILET ROOM EXHAUST	B	LB-452	3000	0.15	1/3	SEE NOTES
EF-5	MAIN ROOF	GENERAL EXHAUST	C	AW-20	350	0.125	1/12	SEE NOTES
EF-7	MAIN ROOF	MAIL ROOM EXHAUST	C	XQ-60	175	0.125	1/12	SEE NOTES
EF-8	MULTI-PURPOSE ROOM ROOF	TOILET EXHAUST	C	XR-60	150	0.125	1/12	SEE NOTES

NOTES:
1. EXHAUST FANS NOT LISTED IN THE SCHEDULE ARE EXISTING TO REMAIN AND NOT IN SCOPE OF WORK.
2. UNIT SHALL BE INSTALLED AS PER MANUFACTURER'S RECOMMENDATION.
3. FAN SHALL BE LISTED BY UNDERWRITERS LABORATORIES (UL 705) AND SHALL BEAR THE AMCA CERTIFIED RATINGS.
4. UNIT CLEARANCE SHALL BE PROVIDED AS PER MANUFACTURER'S RECOMMENDATION.
5. PROVIDE THE FOLLOWING AS REQUIRED: (FACTORY INSTALLED/SUPPLIED IF NOT CONTRACTOR SHALL PROVIDE).
   - NEMA RATED DISCONNECT SWITCH.
   - SPEED CONTROLLER.
6. PROVIDE EXHAUST FANS WITH BACKDRAFT DAMPER & NEMA RATED DISCONNECT SWITCH.
7. ROOF MOUNTED EXHAUST FAN SHALL BE PROVIDED WITH FACTORY PRE-FABRICATED 24" HIGH SOUND ABSORBING ROOF CURB AND ADAPTER.
8. PROVIDE NEMA PREMIUM EFFICIENT MOTOR.
9. PROVIDE THERMAL OVERHEAT PROTECTION.
10. REFER TO ELECTRICAL DWGS FOR WIRING, CIRCUIT BREAKER AND DISCONNECT SWITCH.
11. CONTROL SEQUENCE OF OPERATION SHALL MATCH THE EXISTING.
12. CONTRACTOR TO PERFORM PRE DEMOLITION TAB PRIOR TO THE REMOVAL OF EXISTING EXHAUST FAN.
13. REPLACE EXHAUST FANS (EF-2 & 3) AS INDICATED ON PLANS WITH NEW. CAPACITIES, CFM'S AND TYPE TO MATCH EXISTING.
14. CONTRACTOR TO COORDINATE POWER REQUIREMENT FOR NEW EXHAUST FAN AND ENSURE REQUIRED POWER CONNECTION IS SAME AS EXISTING EXHAUST FAN BEING REMOVED. ANY CHANGES TO THE POWER REQUIREMENT SHALL BE COORDINATED WITH ELECTRICAL CONTRACTOR. IF NECESSARY, PROVIDE REQUIRED BRANCH WIRING, CIRCUIT BREAKER AND OTHER OVERCURRENT PROTECTION DEVICES PER MANUFACTURER'S RECOMMENDATION AND TO COMPLY WITH CURRENT NEC REQUIREMENT.
15. PROVIDE NEW EXHAUST FAN TAG TO MATCH ACTUAL FIELD CONDITION. THE TAGS PROVIDED ON DEMOLITION DRAWINGS ARE BASED ON EXISTING 1961 BASE BUILDING FAN SCHEDULE.



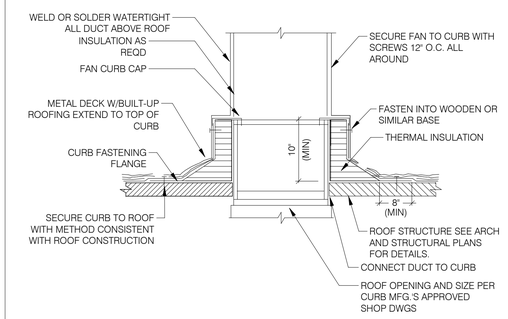
5 M-701 EQUIPMENT ROOF CURB DETAIL
NO SCALE



NOTE:

1. SPREAD BACK GRAVEL A MIN OF 30" IN ALL DIRECTIONS. FLASH WITH 90# MINERAL FACED BASE FLASHING. STRIP WITH 3 LAYERS OF ROOFING FELT EMBEDDED ASPHALT. GRAVEL TO MATCH.

2 M-701 GOOSENECK DETAIL
NO SCALE



NOTES:

1. SPUD BACK GRAVEL A MIN OF 30" ALL DIRECTIONS. FLASH WITH 90# MINERAL FACED BASE FLASHING. STRIP WITH 3 LAYERS OF ROOFING FELT EMBEDDED ASPHALT. GRAVEL TO MATCH.
2. METAL DECK SHALL BE COORDINATED WITH ARCHITECT DRAWINGS.

3 M-701 DUCT PENETRATION THRU ROOF DETAIL
NO SCALE

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License No. 36395, Expiration Date 11/24/2024

SHEET TITLE
MECHANICAL DETAILS

DRAWN BY	CHECKED BY	SHEET NO
DS	VK	M-701

SET DESCRIPTION: 100% CONSTRUCTION DOCUMENTS
DATE: 12/29/2023

STAPLE EDGE

GENERAL NOTES

1. ALL PLUMBING WORK SHALL COMPLY WITH APPLICABLE CODES AND THE AUTHORITY HAVING JURISDICTION.
2. CONTRACTOR SHALL OBTAIN AND PAY FOR PLUMBING PERMITS, FEES AND TAXES.
3. CONTRACTOR SHALL NOT MAKE CHANGES THAT CHANGE THE INTENT OF THE DOCUMENTS WITHOUT THE WRITTEN PERMISSION FROM THE ARCHITECT.
4. CONTRACTOR ASSUMES RESPONSIBILITY FOR PROPER ARRANGEMENT OF PIPES, FIXTURES, ETC.TO CONNECT PPROVED EQUIPMENT IN A PROPER AND APPROVED MANNER. CONTRACTOR SHALL FOLLOW EQUIPMENT ANUFACTURER'S DETAILED INSTRUCTIONS AND THE CONTRACT DOCUMENTS. NOTIFY THE ARCHITECT/ENGINEER BEFORE PROCEEDING WITH ALL WORK, EQUIPMENT INSTALLATION OR CONNECTIONS SHALL BE MADE IN A MANNER WHICH MAY VOID THE MANUFACTURER'S WARRANTY.
5. BEFORE POURING CONCRETE FLOORS, FILL WALL PATCH, INSTALL ALL REQUIRED SLEEVES.
6. DO NOT CUT STRUCTURAL MEMBERS WITHOUT THE APPROVAL OF THE ARCHITECT/ENGINEER AND PERFORM CUTTING IN A MANNER AS DIRECTED BY ARCHITECT/ENGINEER.
7. PROVIDE SLEEVES FOR ALL FLOOR PENETRATIONS WITH TOP OF SLEEVE 2" ABOVE FINISHED FLOOR.
8. PLUMBING CONTRACTOR TO FURNISH AND INSTALL ALL PLUMBING FIXTURES COMPLETELY AS SPECIFIED ON DRAWINGS.
9. MAINTAIN WORK AREA CLEAN AT ALL TIMES DURING CONSTRUCTION. AFTER COMPLETING INSTALLATION OF WORK, CLEAN ALL FIXTURES OF ALL RUBBISH, PLASTER, DIRT AND OTHER DEBRIS
10. TEST ALL SYSTEMS AND FIXTURES SHALL OPERATE SATISFACTORILY AS DESIGNED AND INTENDED. REPORT ANY DEFICIENCIES TO THE ARCHITECT/ENGINEER.
11. ALL PIPING SYSTEMS SHALL BE TESTED AT DESIGN PRESSURES FOR A PERIOD OF TIME AS PRESCRIBED BY BCPS DESIGN STANDARDS.
12. CONTRACTOR SHALL REFER TO ARCHITECTURAL DRAWINGS, EQUIPMENT, LAYOUT DRAWINGS, AND ALL OTHER RELATED DRAWINGS AS REQUIRED FOR DIMENSIONS, DETAILS, ETC. PLUMBING LAYOUT SHOWN ON THIS DRAWING IS FOR GENERAL ARRANGEMENT ONLY. CONTRACTOR SHALL COORDINATE ALL WORK WITH FIELD CONDITIONS AND ALL OTHER TRADES INVOLVED AS REQUIRED. DO NOT SCALE DIMENSIONS FROM THIS DRAWING. CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN FIELD AS REQUIRED.
13. CONTRACTOR SHALL REFER TO MANUFACTURER'S INSTALLATION INSTRUCTIONS AND CUT SHEETS AS REQUIRED FOR INSTALLATION OF EQUIPMENT.
14. CONTRACTOR SHALL FURNISH AND INSTALL ALL PIPING, FITTINGS, VALVES, PARTS AND ACCESSORIES REQUIRED FOR PROPER INSTALLATION AND OPERATION OF PLUMBING SYSTEM. (INCLUDING ALL FITTINGS AND DEVICES REQUIRED BY CODE, SUCH AS CHECK VALVES, VACUUM BREAKERS, SAFETY RELIEF VALVES, VACUUM RELIEF, ETC.
15. ALL PIPING SHALL BE HUNG, FIRMLY ANCHORED AND SUPPORTED IN ACCORDANCE WITH MSS SP-58 MSS SP-69.
16. CONTRACTOR SHALL PROVIDE NECESSARY SUPPORTING DEVICES FOR PLUMBING FIXTURES INSTALLATION SPECIFIED I N THIS DOCUMENTS.
17. CONTRACTOR SHALL SLEEVE ALL PIPING CROSSING THROUGH OR UNDERNEATH STRUCTURAL MEMBERS. NOTIFY ARCHITECT AND ENGINEERS PRIOR TO PROCEEDINGS WITH WORK TO ASSURE STRUCTURAL SUPPORT WILL NOT BE AFFECTED.
18. DOMESTIC WATER SHALL BE SLOPED (MINIMUM) TO DRAIN POINTS. DRAIN VALVES SHALL BE PROVIDED AT LOW POINTS.
19. ALL ILLUSTRATED DRAINAGE PIPING IS BELOW THE FLOOR ON WHICH IT IS DRAWN UNLESS OTHERWISE NOTED. ALL DOMESTIC WATER AND VENT PIPING ILLUSTRATED IS ABOVE OR AT THE CEILING ON WHICH IT IS DRAWN UNLESS OTHERWISE NOTED.
20. PROVIDE PRODUCTS AND FIXTURES AS SPECIFIED OR APPROVED EQUIVALENT.
21. ALL PIPING PASSING THROUGH BUILDING EXPANSION JOINTS SHALL BE PROVIDED WITH ADEQUATE FLEXIBLE CONNECTIONS TO ACCOMMODATE THE ANTICIPATED MOVEMENT. REFER TO STRUCTURAL AND ARCHITECTURAL DRAWINGS FOR EXPANSION JOINT SIZE AND LOCATION.
22. ALL EXISTING PLUMBING PIPES WHERE NEW PIPES ADDED NOT MENTIONED TO REMAIN, CONTRACTOR TO FIELD VERIFY THE EXACT LOCATION, SIZE, AND WORKING CONDITION OF ALL EXISTING PIPES, A SURVEY NEED TO BE CONDUCTED AND REPLACE WITH NEW AS NEEDED.
23. CONTRACTOR TO FIELD VERIFY ALL EXISTING STORM DRAINS AND ALL ASSOCIATED PIPES NEED TO CLEAN FOR DEBRIS AND CONTAMINANTS TO AVOID ANY BLOCKAGES.
24. CONTRACTOR TO ADJUST SPRINKLER HEADS AND BRANCH PIPING AS NECESSARY TO ACCOMMODATE WORK PROPOSED WITHIN THIS SCOPE. SPRINKLER CONTRACTOR SHALL REMOVE AND REPLACE PIPING/HEADS AS NEEDED AND RETURN SYSTEM BACK TO OPERATION ONCE WORK IS COMPLETE WHERE THE SPRINKLER DESIGN AND HEADS EXISTS.

CODES AND STANDARDS

1. IBC - INTERNATIONAL BUILDING CODE (2018 EDITION)
2. IPC - INTERNATIONAL PLUMBING CODE (2018 EDITION)
3. IECC - INTERNATIONAL ENERGY CONSERVATION CODE (2018 EDITION)
4. IFGC - INTERNATIONAL FUEL GAS CODE (2018 EDITION)
5. IGCC - INTERNATIONAL GREEN CONSTRUCTION CODE (2018 EDITION)
6. AMERICANS WITH DISABILITY ACT ACCESSIBILITY GUIDELINES (ADAAG 2010) AND MARYLAND ACCESSIBILITY CODE (COMAR.09.12.53)

DEMOLITION NOTES

1. WHERE EXISTING PLUMBING FIXTURES ARE INDICATED TO BE REMOVED, REMOVE EXISTING FIXTURE, TRIM, AND ALL ASSOCIATED PIPING AND HARDWARE. REMOVE SERVICE BRANCHES BACK TO NEAREST MAIN AND CAP. DEAD LEGS SHALL NOT EXCEED 2'-0" IN LENGTH.
2. DEMOLITION SHALL BE PERFORMED IN SUCH A MANNER THAT WILL NOT DAMAGE ADJOINING SURFACES OR EQUIPMENT INDICATED TO REMAIN. WHERE SURFACES MUST BE REMOVED TO COMPLETE DEMOLITION, THE CONTRACTOR SHALL REPLACE AND REPAIR THE SURFACES BACK TO THE ORIGINAL CONDITION.
3. WHERE DEMOLITION WOULD AFFECT THE STRUCTURAL INTEGRITY OF THE BUILDING, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT/ENGINEER PRIOR TO PROCEEDING WITH DEMOLITION.
4. ALL REMOVED FIXTURES AND TRIM SHALL REMAIN THE PROPERTY OF THE OWNER AND THE CONTRACTOR SHALL STORE ON SITE OR REMOVE FROM SITE SAID FIXTURES AS DIRECTED BY THE OWNER.
5. THE CONTRACTOR SHALL COORDINATE ALL DEMOLITION REQUIRED WITH SYSTEMS THAT MUST REMAIN IN SERVICE DURING CONSTRUCTION. WHERE SYSTEMS MUST REMAIN IN SERVICE DURING CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE MEANS AND METHODS OF ISOLATING THE SYSTEMS TO BE REMOVED WITH THE SYSTEMS TO REMAIN IN SERVICE. MEANS AND METHODS SHALL INCLUDE TEMPORARY CAPS AND ISOLATION VALVES.

SYMBOLS

PIPE REPRESENTATION

- COLD WATER PIPING
- HOT WATER PIPING
- HOT WATER RETURN PIPING
- G — GAS PIPING
- GAS VENT PIPING
- SAN — SANITARY PIPING ABOVE GRADE
- SAN — SANITARY PIPING BELOW GRADE
- GW — GREASE SANITARY ABOVE GRADE
- GW — GREASE SANITARY BELOW GRADE
- VENT PIPING
- ST — STORM WATER PIPING ABOVE GRADE
- ST — STORM WATER PIPING BELOW GRADE
- EST — EMERGENCY STORM WATER PIPING
- ID — INDIRECT DRAINAGE PIPE
- DEMOLITION CW
- DEMOLITION HW
- DEMOLITION HWR
- DEMOLITION GAS
- DEMOLITION SAN ABOVE GROUND
- DEMOLITION SAN BELOW GROUND
- DEMOLITION VENT

PIPE VALVES AND ACCESSORIES

- REDUCED PRESSURE ZONE ASSEMBLY (ASSE1013)
- DOUBLE CHECK VALVE ASSEMBLY (ASSE 1015)
- BALL VALVE
- CHECK VALVE
- SOLENOID VALVE
- GATE VALVE
- PRESSURE REDUCING VALVE
- THERMOSTATIC MIXING VALVE
- BALANCING VALVE
- VACUUM RELIEF VALVE
- BACKFLOW PREVENTER (ASSE 1024)
- BACK WATER VALVE
- PUMP
- A — WATER HAMMER ARRESTOR ('A' = PDI SIZE)
- PRESSURE GAUGE
- THERMOMETER GAUGE
- A — AQUASTAT VALVE
- STRAINER

PIPE FITTINGS

- REDUCER/INCREASER
- CAPPED CONNECTION
- PIPE UNION
- ELBOW TURNED UP
- ELBOW TURNED DOWN
- TEE UP
- TEE DOWN
- SHUT-OFF VALVE IN RISER

NOTE: ALL SYMBOLS MAY NOT APPEAR ON THE DRAWINGS.

ANNOTATIONS

- CW / 1 — DOMESTIC COLD WATER RISER DESIGNATION
- HW / 1 — DOMESTIC HOT WATER RISER DESIGNATION
- HWR / 1 — DOMESTIC HOT WATER RETURN RISER DESIGNATION
- SAN / 1 — SANITARY WATER RISER DESIGNATION
- ST / 1 — STORM RISER DESIGNATION
- EST / 1 — EMERGENCY STORM RISER DESIGNATION
- ST(G) / 1 — GREEN STORM RISER DESIGNATION
- EST(G) / 1 — EMERGENCY GREEN STORM RISER DESIGNATION
- V / 1 — VENT RISER DESIGNATION
- G / 1 — GAS RISER DESIGNATION
- 1 — REVISION NUMBER
- X' — PIPE SIZE
- X' — PIPE SIZE/NOTE
- POINT OF DEMOLITION
- POINT OF CONNECTION

DETAIL ANNOTATIONS

- 2 / P701 — DETAIL NUMBER / WHERE THE DETAIL IS DRAWN
- 2 / P102 | P701 — DETAIL NUMBER / WHERE THE DETAIL IS DRAWN / WHERE THE DETAIL REFERENCED

DRAINS

- AD — AREA DRAIN
- FD — FLOOR DRAIN
- ORD — OVER FLOW ROOF DRAIN
- ORD(G) — OVER FLOW ROOF DRAIN-GREEN ROOF
- RD — ROOF DRAIN
- RD(G) — ROOF DRAIN-GREEN ROOF
- ERD — EMERGENCY ROOF DRAIN
- ERD(G) — EMERGENCY ROOF DRAIN-GREEN ROOF
- GD — GARAGE DRAIN
- FCO — FLOOR CLEAN OUT
- GCO — GRADE CLEAN OUT
- FS — FLOOR SINK DRAIN
- TD — TRENCH DRAIN
- OSD — OPEN SITE DRAIN
- FUNNEL FLOOR DRAIN

MISCELLANEOUS

- CO — HORIZONTAL CLEANOUT
- WH — WALL HYDRANT
- RH — ROOF HYDRANT
- GH — GARDEN HYDRANT
- HB — HOSE BIB
- GM — GAS METER
- M — WATER METER
- F — WATER FILTER
- VACUUM BREAKER
- TEMPERATURE AND PRESSURE RELIEF VALVE
- DIRT LEG
- BREAK PIPE BELOW

NOTE: ALL SYMBOLS MAY NOT APPEAR ON THE DRAWINGS.

ABBREVIATIONS

AAV	AIR ADMITTANCE VALVE
ABV	ABOVE
AD	AREA DRAIN
ADA	AMERICAN DISABILITY ACT
AFF	ABOVE FINISHED FLOOR
AP	ACCESS PANEL
ARCH	ARCHITECTURAL
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASPE	AMERICAN SOCIETY OF PLUMBING ENGINEERS
ASSE	AMERICAN SOCIETY OF SANITARY ENGINEERS
BLDG	BUILDING
BLW	BELOW
BMS	BUILDING MANAGEMENT SYSTEM
BOF	BOTTOM OF FOOTING
BOP	BOTTOM OF PIPE
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
BWV	BACK WATER VALVE
CFM	CUBIC FEET PER MINUTE
CHB	CANWASH ROOM HOSE BIB
CLG	CEILING
CO	CLEAN OUT
COP	CENTER OF PIPE
COTG	CLEAN OUT TO GRADE
CONT	CONTINUATION
CW	COLD WATER
DD	DECK DRAIN
DFU	DRAINAGE FIXTURE UNIT
DIA	DIAMETER
DMR	DISTRIBUTED METER ROOM
DF	DRINKING FOUNTAIN
DSN	DOWNSPOUT NOZZLE
EA	EACH
EEW	EMERGENCY EYEWASH STATION
ELEV	ELEVATION
EQUIP	EQUIPMENT
ERD	EMERGENCY ROOF DRAIN
ERD(G)	EMERGENCY ROOF DRAIN-GREEN ROOF
EST	EMERGENCY STORM
ET	EXPANSION TANK
F	WATER FILTER
FCO	FLOOR CLEAN OUT
FD	FLOOR DRAIN
FFE	FINISHED FLOOR ELEVATION
FL	FLOOR
FS	FLOW SWITCH
FT	FEET
FM	FORCED MAIN
GAL	GALLON
GCO	GRADE CLEAN OUT
GD	GARBAGE DISPOSER
GH	GARDEN HYDRANT
GI	GREASE INTERCEPTOR
GPM	GALLONS PER MINUTE
GW	GREASE WASTE
HB	HOSE BIB
HDPE	HIGH DENSITY POLYETHYLENE
HP	HORSE POWER
HW	HOT WATER SUPPLY
HWR	HOT WATER RETURN
HPCW	HIGH PRESSURE COLD WATER
HWSH	HOT WATER STORAGE/HEATER
IN	INCH
INV	INVERT
KW	KILOWATT
LAV	LAVATORY
MAX	MAXIMUM
MBH	THOUSAND BTU PER HOUR
MECH	MECHANICAL
MFR	MANUFACTURER
MGCV	MASTER GAS CONTROL VALVE
MIN	MINIMUM
MS	MOP SINK
MTD	MOUNTED
NC	NORMALLY CLOSED
NG	NATURAL GAS
NIC	NOT IN CONTRACT
NO.	NUMBER
NO	NORMALLY OPEN
NT	ACID NEUTRALIZATION TANK
ORD	OVERFLOW ROOF DRAIN
ORD(G)	OVERFLOW ROOF DRAIN-GREEN ROOF
OSD	OPEN SITE DRAIN
P	PUMP
PD	PLANTRER DRAIN
PDD	POOL DECK DRAIN
PDI	PLUMBING AND DRAINAGE INSTITUTE
PH	PHASE(ELECTRICAL)
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
RCV	RISER CONTROL VALVE
REF	REFRIGERATOR
RD	ROOF DRAIN
RD(G)	ROOF DRAIN-GREEN ROOF
RH	ROOF HYDRANT
RPM	REVOLUTIONS PER MINUTE
RR	RAIN WATER REUSE
RW	RAIN WATER
RWC	RAIN WATER CONDUCTOR
SA	SHOCK ABSORBER
SAN	SANITARY/WASTE PIPE
SFU	SUPPLY FIXTURE UNIT
SF	SQUARE FOOT
SS	STAINLESS STEEL
ST	STORM WATER
STRUC	STRUCTURAL
TD	TRENCH DRAIN
TEMP	TEMPERATURE
TOF	TOP OF FOOTING
TOF	TOP OF PIPE
TMV	THERMOSTATIC MIXING VALVE
TP	TRAP PRIMER TUBE
TW	TEMPERED WATER
TYP	TYPICAL
URD	UNIBODY DUAL-ROOF DRAIN
VP	VENT PIPE
VTR	VENT THROUGH ROOF
W	WATT
WCO	WALL CLEAN OUT
WH	WALL HYDRANT
WM	WATER METER
WSSC	WASHINGTON SUBURBAN SANITARY COMMISSION
WTR	WATER
W/	WITH
W/O	WITHOUT

NOTE: ALL ABBREVIATIONS MAY NOT APPEAR ON THE DRAWINGS.

PLUMBING DRAWING LIST

SHEET	DRAWING	TITLE
1	P-001	GENERAL NOTES, SYMBOLS & ABBREVIATIONS
2	PD-101	ROOF PLAN - PLUMBING DEMOLITION AREA A1
3	PD-102	ROOF PLAN - PLUMBING DEMOLITION AREA A2
4	P-101	ROOF PLAN - PLUMBING NEW WORK AREA A1
5	P-102	ROOF PLAN - PLUMBING NEW WORK AREA A2
6	P-701	PLUMBING DETAILS

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LEUTERIO THOMAS, LLC
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NATIONAL HARBOR, MD 20745
301-203-1784

REVISIONS		
DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/29/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · MICHAEL A. LEUTERIO · NO. 36395 · PROFESSIONAL ENGINEER · 12/29/2023

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland. License No. 36395, Expiration Date 11/24/2024.

SHEET TITLE
GENERAL NOTES, SYMBOLS & ABBREVIATIONS

DRAWN BY	CHECKED BY	SHEET NO
AK	NK	P-001

SET DESCRIPTION: 100% CONSTRUCTION DOCUMENTS
DATE: 12/29/2023

1/4/2024 7:03:56 PM 2310I6.00_R23_Plumbing_detached.rvt

THIS SHEET IS 30" X 42" A1 FULL SIZE.

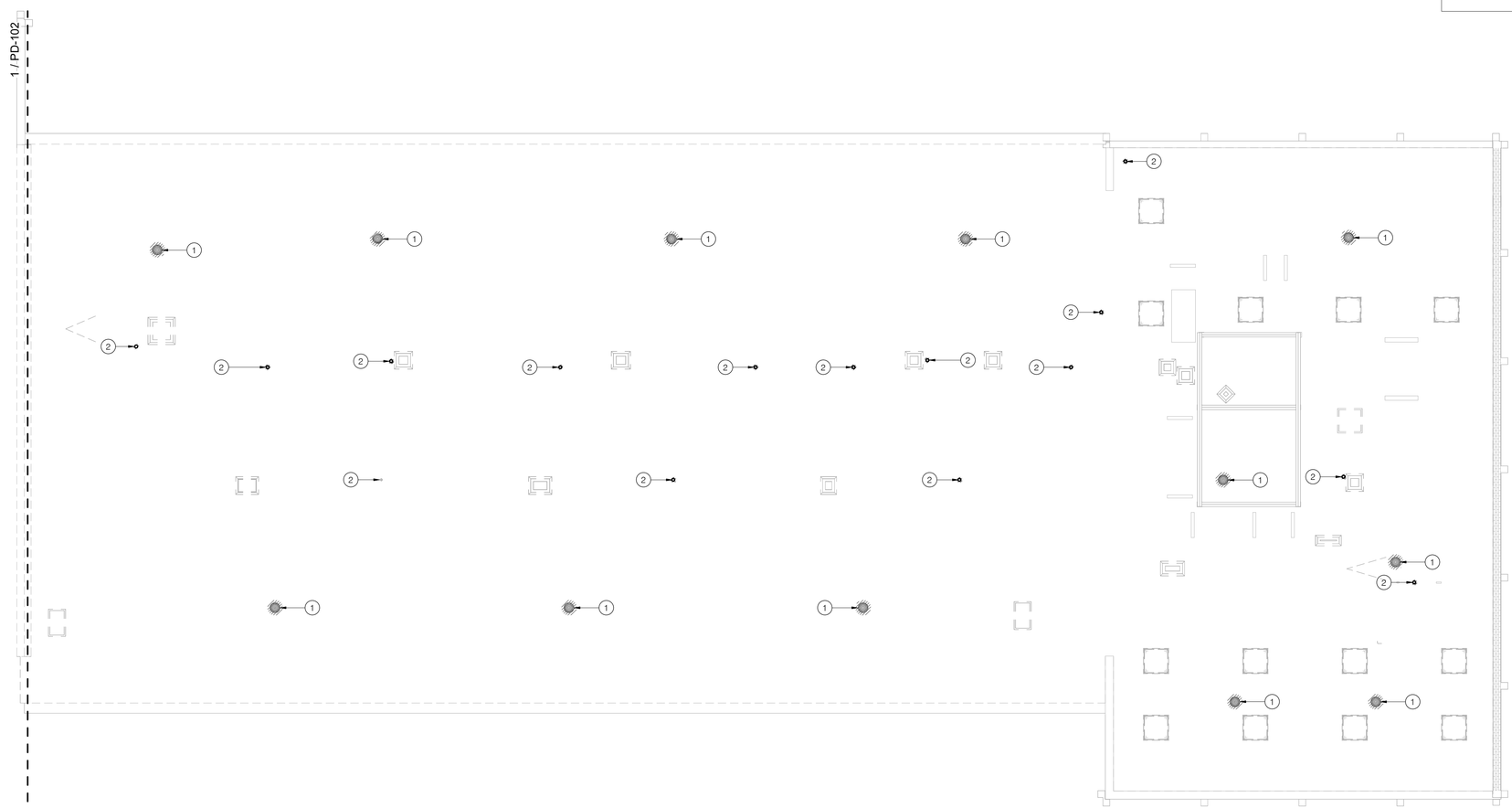
STAPLE EDGE

DEMOLITION KEY NOTES

1. REMOVE EXISTING ROOF DRAIN UP TO FIRST ELBOW BELOW ROOF DECK. PLUG THE OPEN END OF THE PIPING UNTIL THE NEW ROOF DRAIN IS INSTALLED. CONTRACTOR TO FIELD VERIFY THE EXACT LOCATION & SIZE. ALSO REFER TO STRUCTURAL FOR ALL SLAB REPAIR NEEDED AT ROOF DRAIN REPLACEMENT LOCATION (TYPICAL).
2. REMOVE EXISTING VENT THROUGH ROOF BELOW ROOF DECK. PLUG THE OPEN END OF THE PIPING UNTIL THE NEW VENT THROUGH ROOF IS INSTALLED, CONTRACTOR TO FIELD VERIFY THE EXACT LOCATION & SIZE (TYPICAL).

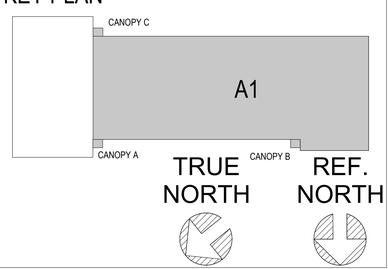
GENERAL NOTES

1. INFORMATION SHOWN ON DRAWINGS PERTAINING TO EXISTING CONDITIONS HAS BEEN OBTAINED FROM AVAILABLE BUILDING DRAWINGS AND MAY NOT INDICATE EXISTING CONDITIONS IN DETAIL OR DIMENSION. DETERMINE EXISTING CONDITIONS PRIOR TO FABRICATION OR PERFORMANCE OF ANY WORK. SHOULD CONDITIONS BE DISCOVERED THAT PREVENT EXECUTION OF THE WORK AS INDICATED, IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING AND AWAIT DIRECTION BEFORE PROCEEDING WITH THE WORK.
2. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING PLUMBING ROOF ELEMENTS PRIOR TO START OF THE WORK.
3. WHERE NEW WORK WOULD AFFECT THE STRUCTURAL INTEGRITY OF THE BUILDING, THE CONTRACTOR SHALL NOTIFY THE OWNER/ARCHITECT/ENGINEER PRIOR TO PROCEEDING.
4. CONTRACTOR IS RESPONSIBLE TO PROTECT THE EXISTING ITEMS TO REMAIN AND RESTORE THE UTILITIES BACK TO ITS ORIGINAL FUNCTIONING.
5. CONTRACTOR TO PROVIDE INSULATION FOR EXISTING STORM PIPING IF DISCOVERED UNINSULATED DURING CONSTRUCTION.



1 PD-101 ROOF PLAN - PLUMBING DEMOLITION AREA A1
1/8" = 1'-0"
0 4' 8' 16'

KEY PLAN



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SHEET TITLE
ROOF PLAN - PLUMBING DEMOLITION AREA A1

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STAPLE EDGE

1 2 3 4

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C

B

A

DEMOLITION KEY NOTES

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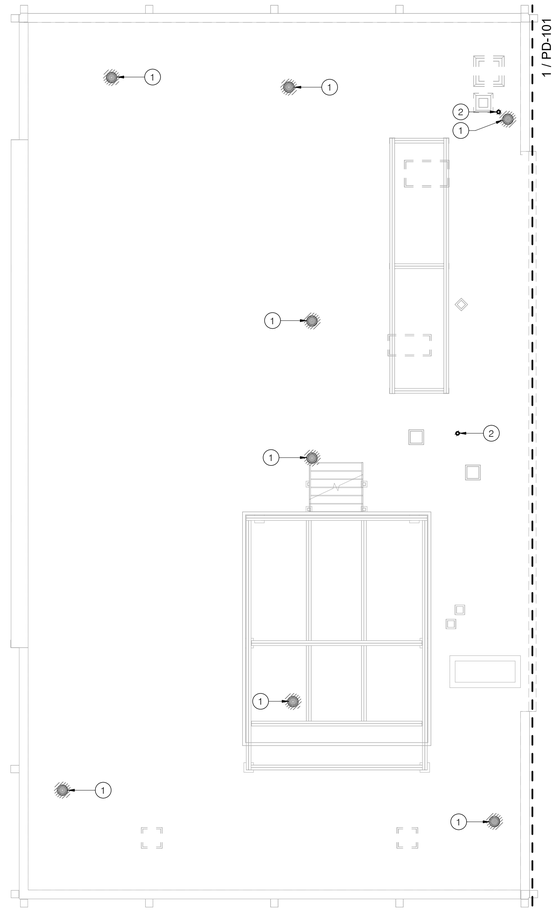
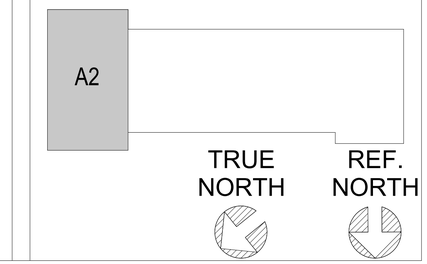
4. CONTRACTOR IS RESPONSIBLE TO PROTECT THE EXISTING ITEMS TO REMAIN AND RESTORE THE UTILITIES BACK TO ITS ORIGINAL FUNCTIONING.
5. CONTRACTOR TO PROVIDE INSULATION FOR EXISTING STORM PIPING IF DISCOVERED UNINSULATED DURING CONSTRUCTION.



1 PD-102 ROOF PLAN - PLUMBING DEMOLITION AREA A2
1/8" = 1'-0"
0 4' 8' 16'

KEY PLAN



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SHEET TITLE
ROOF PLAN - PLUMBING DEMOLITION AREA A2

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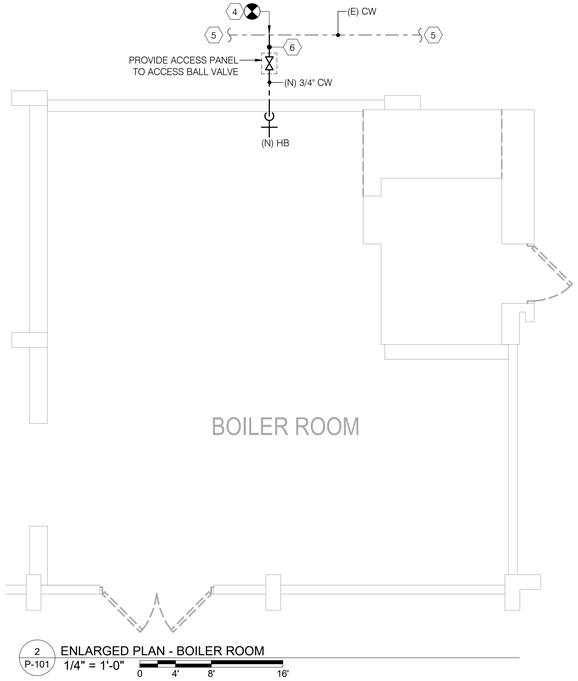
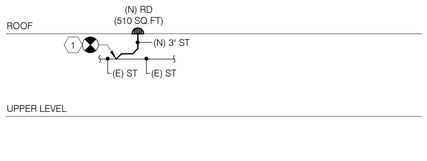
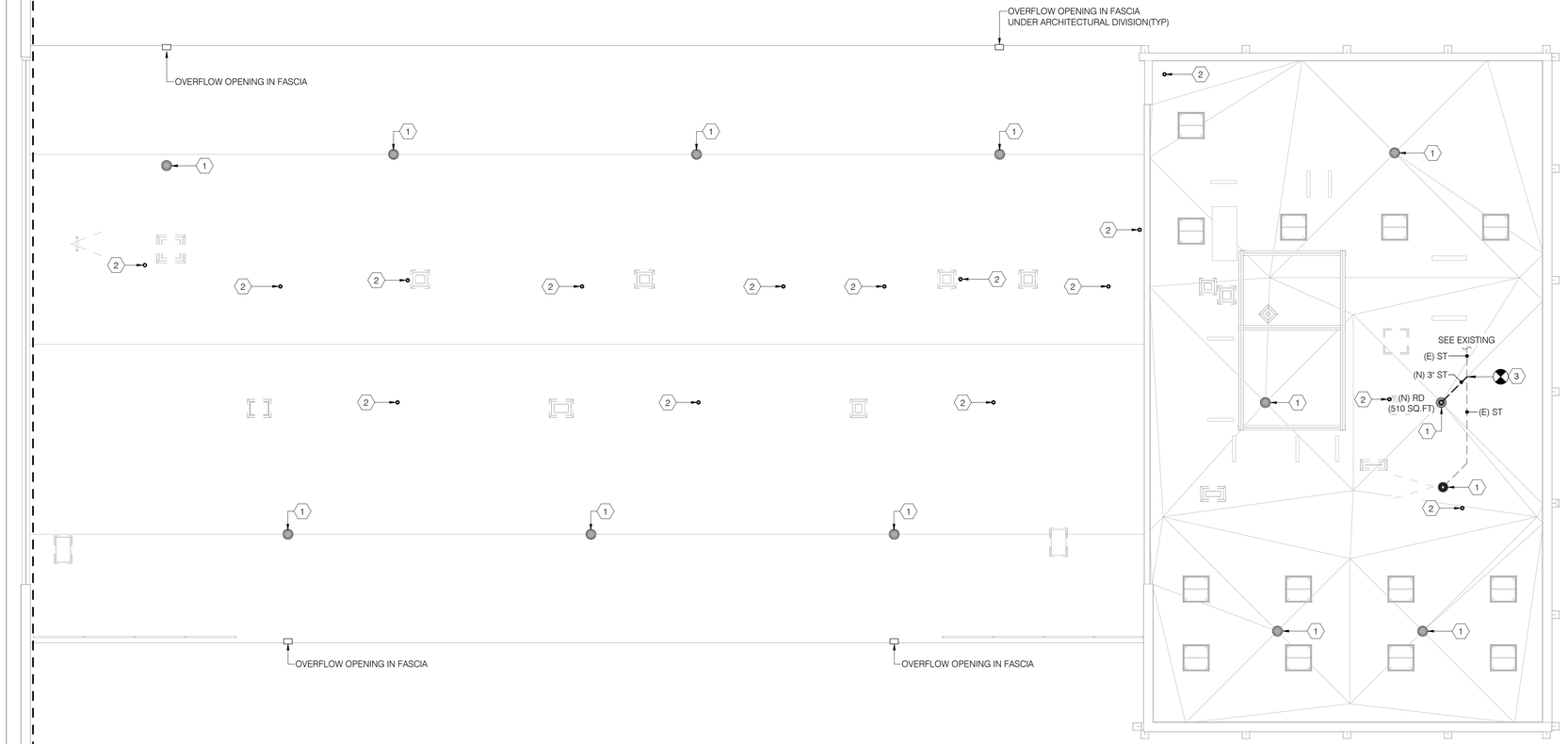
STAPLE EDGE



2 P-101 ENLARGED PLAN - BOILER ROOM
1/4" = 1'-0"
0 4' 8' 16'



3 P-101 PARTIAL STORM RISER DIAGRAM Copy 1
NO SCALE



1 P-101 ROOF PLAN - PLUMBING NEW WORK AREA A1
1/8" = 1'-0"
0 4' 8' 16'

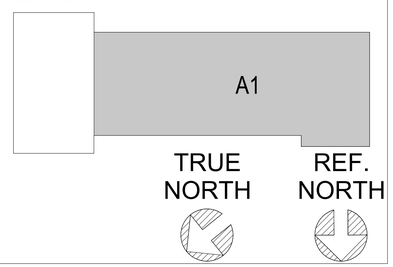
SHEET KEY NOTES

1. PROVIDE NEW ROOF DRAIN, COMPLETE WITH THE DOME AND ALL ASSOCIATED FITTINGS (BASIS OF DESIGN: JAY R. SMITH - 1015) TO MATCH EXISTING SIZE. EXTEND THE PIPING UP TO NEAREST MAIN ON FLOOR BELOW. CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY AND MATCH THE NEW STORM PIPING TO EXISTING. COORDINATE WITH OTHER TRADES TO ENSURE REQUIRED SLOPES ARE PROVIDED AROUND THE ROOF DRAIN (TYPICAL).
2. PROVIDE NEW VENT THROUGH ROOF TO MATCH EXISTING SIZE AND CONNECT BELOW FLOOR EXISTING VENT TO NEW VENT THOROUGH ROOF CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY AND MATCH THE PIPING TO EXISTING. COORDINATE WITH OTHER TRADES TO ENSURE REQUIRED FLASHING IS PROVIDED AROUND THE NEW VENT THROUGH ROOF (TYPICAL).
3. CONNECT NEW 3" ST TO EXISTING STORM MAIN AS SHOWN. PRIOR TO CONNECTION CONTRACTOR TO FIELD VERIFY THE EXISTING PIPE SIZE, CONDITION AND EXACT LOCATION OF THE EXISTING PIPE.
4. CONNECT NEW 3/4" CW PIPE TO EXISTING MINIMUM 1" CW PIPE. PRIOR TO CONNECTION CONTRACTOR TO FIELD VERIFY THE EXISTING PIPE SIZE, CONDITION AND EXACT LOCATION OF THE EXISTING PIPE.
5. SEE EXISTING DRAWINGS FOR CONTINUATION. CONTRACTOR TO FIELD VERIFY THE EXISTING PIPE SIZE, CONDITION AND EXACT LOCATION OF THE EXISTING PIPE.
6. ALL PIPING AND VALVES IF IDENTIFIED AS EXPOSED TO THE ELEMENTS SHALL BE INSULATED AND WITH HEAT TRACE. PROVIDE JUNCTION BOX AND COORDINATE POWER REQUIREMENT AND CIRCUITING WITH ELECTRICAL CONTRACTOR. HEAT TRACE SHALL BE AT 8W/LF. HEAT TRACING THERMOSTAT SET POINT MUST BE NO LOWER THAN 40°F AND HIGHER THAN 45°F, CONTRACTOR TO CONFIRM SET POINT BY FIELD INSPECTION. PROVIDE HEAT TRACE PRODUCT 2700 SERIES OF SELF REGULATING HEATING CABLE.

GENERAL NOTES

1. CONTRACTOR SHALL SCHEDULE ALL WORK IN ACCORDANCE WITH OWNER'S REQUIREMENTS.
2. CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LOCATIONS, AND CLEARANCES PRIOR TO START OF CONSTRUCTION.
3. CONTRACTOR TO PROVIDE INSULATION FOR EXISTING STORM PIPING IF DISCOVERED UNINSULATED DURING CONSTRUCTION.

KEY PLAN



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SHEET TITLE
ROOF PLAN - PLUMBING NEW WORK AREA A1

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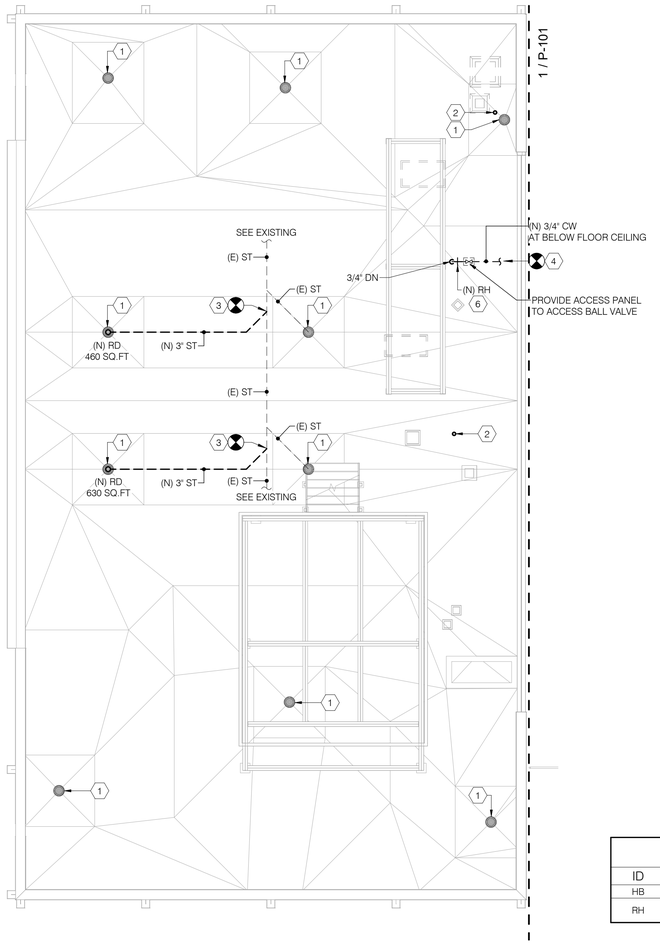
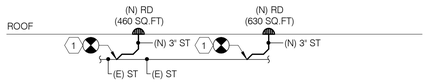


1 / P-102 ROOF PLAN - PLUMBING NEW WORK AREA A2
1/8" = 1'-0" 0 4' 8' 16'



2 / P-102 PARTIAL STORM RISER DIAGRAM
NO SCALE

SHEET KEY NOTES

1. PROVIDE NEW ROOF DRAIN, COMPLETE WITH THE DOME AND ALL ASSOCIATED FITTINGS (BASIS OF DESIGN: JAY R. SMITH - 1015) TO MATCH EXISTING SIZE. EXTEND THE PIPING UP TO NEAREST MAIN ON FLOOR BELOW. CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY AND MATCH THE NEW STORM PIPING TO EXISTING. COORDINATE WITH OTHER TRADES TO ENSURE REQUIRED SLOPES ARE PROVIDED AROUND THE ROOF DRAIN (TYPICAL).
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3. CONNECT NEW 3" STORM PIPE TO EXISTING STORM MAIN AS SHOWN. PRIOR TO CONNECTION CONTRACTOR TO FIELD VERIFY THE EXISTING PIPE SIZE, CONDITION AND EXACT LOCATION OF THE EXISTING PIPE.
4. CONNECT NEW 3/4" CW PIPE FROM NEW ROOF HYDRANT AT BELOW FLOOR TO EXISTING MINIMUM 1" CW PIPE AVAILABLE IN THE ADJACENT GIRL'S RESTROOM. PRIOR TO CONNECTION CONTRACTOR TO FIELD VERIFY THE EXISTING PIPE SIZE, CONDITION AND EXACT LOCATION OF THE EXISTING CW PIPE.
5. ALL PIPING AND VALVES IF IDENTIFIED AS EXPOSED TO THE ELEMENTS SHALL BE INSULATED AND WITH HEAT TRACE. PROVIDE JUNCTION BOX AND COORDINATE POWER REQUIREMENT AND CIRCUITING WITH ELECTRICAL CONTRACTOR. HEAT TRACE SHALL BE AT 8W/LF. HEAT TRACING THERMOSTAT SET POINT MUST BE NO LOWER THAN 40°F. AND HIGHER THAN 45°F. CONTRACTOR TO CONFIRM SET POINT BY FIELD INSPECTION. PROVIDE HEAT TRACE PRODUCT 2700 SERIES OF SELF REGULATING HEATING CABLE.
6. CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY AND PLACE THE ROOF HYDRANT IN A LOCATION SUCH THAT MINIMUM 20' SPACE IS NEEDED BELOW THE ROOF FOR INSTALLATION OF NEW ROOF HYDRANT AS PER MANUFACTURER RECOMENDATION. AND COORDINATE WITH OTHER TRADED TO ENSURE THERE IS NO CLASHES.

GENERAL NOTES

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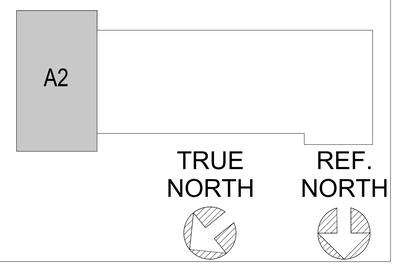
HOSE STATION SCHEDULE

ID	FIXTURE	MANUFACTURER	MODEL	DESCRIPTION
HB	HOSE BIB	WOODFORD	24	CHROME ANTI-SIPHON, VACUUM BREAKER PROTECTED WALL FAUCET.
RH	ROOF HYDRANT	WOODFORD	SRH-MS	NON-FREEZE ROOF HYDRANT FOR CLEANING & WASHDOWN OF MECHANICAL UNITS WITH NO DRAIN LINE.

KEY PLAN



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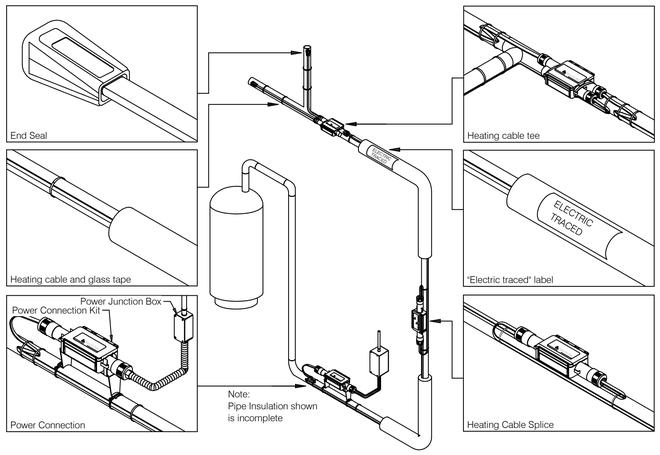
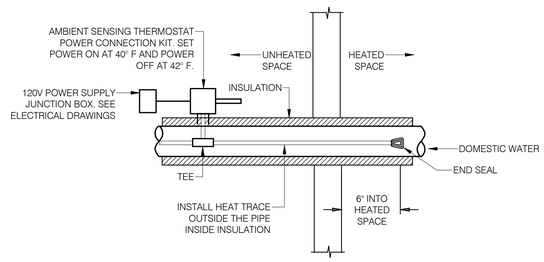


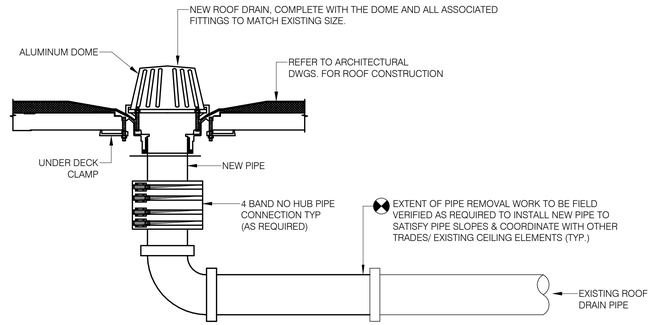


DOMESTIC WATER PIPING

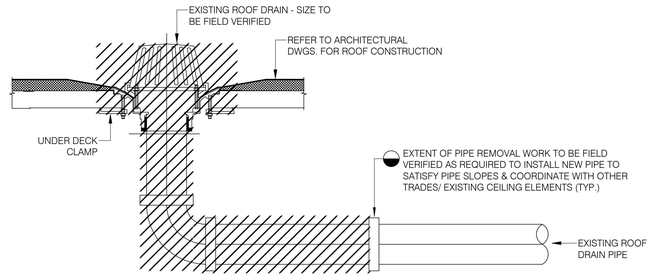
NOTES:

1. CONTRACTOR INSTALLING HEAT TRACE SHALL PROVIDE THERMOSTAT, SENSOR AND ALL ASSOCIATED ACCESSORIES AND REQUIRED TO ALLOW AUTOMATIC CONTROL THAT WILL SHUT OFF THE HEAT TRACE SYSTEM WHEN UNHEATED SPACE AMBIENT TEMPERATURE IS ABOVE 42° F.
2. COORDINATE WITH ELECTRICAL DRAWINGS AND HEAT TRACE VENDOR TO VERIFY JUNCTION BOX LOCATION, QUANTITIES, HEAT TRACE SPECIFICATION, MOUNTING AND CONNECTION REQUIREMENTS PRIOR TO INSTALLATION.
3. REQUIRED WATTAGE PER RUN IS BASED ON 5 WATTS PER LINEAR FOOT.
4. END OF HEATING CABLE FOR DOMESTIC WATER PIPING SHALL EXTEND 6 INCHES INTO THE HEATED PLENUM.

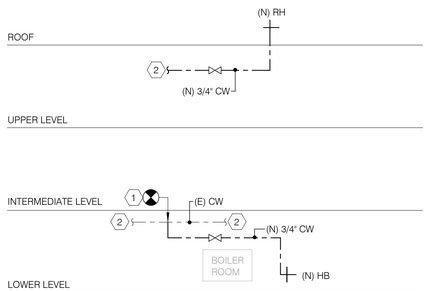
5 / P-701 HEAT TRACE DETAIL
NO SCALE



1 / P-701 NEW ROOF DRAIN DETAIL
NO SCALE



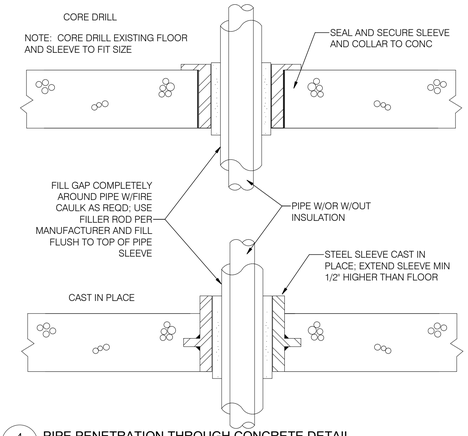
2 / P-701 DEMOLITION ROOF DRAIN DETAIL
NO SCALE



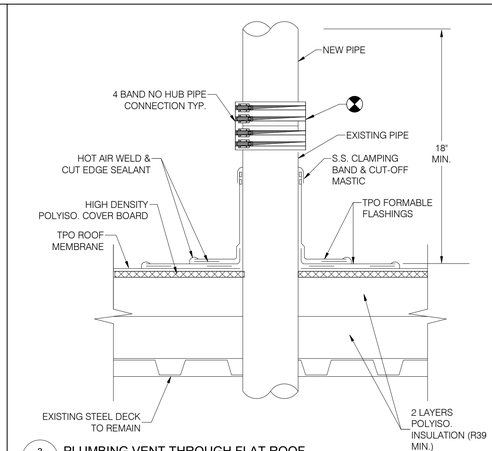
NOTES:

1. CONNECT NEW 1" CW PIPE TO EXISTING CW PIPE. PRIOR TO CONNECTION CONTRACTOR TO FIELD VERIFY THE EXISTING PIPE SIZE, CONDITION AND EXACT LOCATION OF THE EXISTING PIPE.
2. SEE EXISTING DRAWINGS FOR CONTINUATION. CONTRACTOR TO FIELD VERIFY THE EXISTING PIPE SIZE, CONDITION AND EXACT LOCATION OF THE EXISTING PIPE.
3. CONNECT NEW 3/4" CW PIPE AT BELOW FLOOR TO EXISTING MINIMUM 1" CW PIPE AVAILABLE IN THE ADJACENT GIRL'S RESTROOM. PRIOR TO CONNECTION CONTRACTOR TO FIELD VERIFY THE EXISTING PIPE SIZE, CONDITION AND EXACT LOCATION OF THE EXISTING PIPE.

6 / P-701 PARTIAL DOMESTIC WATER RISER DIAGRAM
NO SCALE



4 / P-701 PIPE PENETRATION THROUGH CONCRETE DETAIL
NO SCALE



3 / P-701 PLUMBING VENT THROUGH FLAT ROOF
NO SCALE

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REVISIONS		
DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/29/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · MICHAEL A. WINES · No. 36396 · PROFESSIONAL ENGINEER
12/29/2023

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland.
License No. 36396, Expiration Date 11/24/2024

SHEET TITLE
PLUMBING DETAILS

DRAWN BY	CHECKED BY	SHEET NO
AK	NK	P-701

SET DESCRIPTION: 100% CONSTRUCTION DOCUMENTS
DATE: 12/29/2023

STAPLE EDGE

ELECTRICAL GENERAL NOTES

1. INSTALLATION OF ALL WORK SHALL BE IN ACCORDANCE WITH THE FOLLOWING REGULATIONS, CODES, ETC.:
   A. LOCAL CODES AND ORDINANCES.
   B. PRACTICES AND PROCEDURES FOLLOWING OSHA STANDARDS.
   C. THE EDITION OF THE NATIONAL ELECTRICAL CODE NFPA 70 (NEC) IN EFFECT.
   D. THE EDITION OF THE INTERNATIONAL BUILDING CODE IN EFFECT.
2. BEFORE SUBMITTING BIDS, THE CONTRACTOR SHALL VISIT THE SITE AND EXAMINE ALL ADJOINING EXISTING BUILDINGS, EQUIPMENT, AND SPACE CONDITIONS ON WHICH HIS WORK IS IN ANY WAY DEPENDENT FOR THE BEST WORKMANSHIP AND OPERATION ACCORDING TO THE INTENT OF THE SPECIFICATIONS AND DRAWINGS. CONTRACTOR SHALL REPORT TO THE ARCHITECT/ENGINEER ANY CONDITION WHICH MIGHT PREVENT HIM FROM INSTALLING HIS EQUIPMENT IN THE MANNER SPECIFIED OR AS SHOWN IN CONTRACT DOCUMENTS TEN BUSINESS DAYS PRIOR TO SUBMISSION OF BIDS. NO CONSIDERATION OR ALLOWANCE WILL BE GRANTED FOR FAILURE TO VISIT THE SITE, NOR FOR ANY ALLEGED MISUNDERSTANDING OF MATERIALS TO BE FURNISHED OR WORK TO BE PERFORMED. THE CONTRACTOR SHALL INCLUDE IN HIS BID PRICE ALL LABOR AND MATERIAL THAT MAY AFFECT HIS WORK.
3. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCOVERED CONFLICTS BETWEEN EXISTING INSTALLATIONS WHICH ARE NOT SCHEDULED FOR DEMOLITION AND THE NEW WORK INDICATED WITHIN THE CONTRACT DOCUMENTS. SUCH NOTIFICATION SHALL BE ACCOMPANIED BY A DRAWING DELINEATING THE PROPOSED SOLUTION PRIOR TO STARTING ANY WORK IN THE AFFECTED AREA.
4. PRIOR TO BEGINNING ANY WORK, SECURE NECESSARY PERMITS OR CLEARANCES FROM THE AUTHORITIES HAVING JURISDICTION. PROVIDE ALL LABOR AND MATERIALS FOR A COMPLETE INSTALLATION. WORK SHALL BE EXECUTED BY EXPERIENCED ELECTRICIANS WHO ARE LICENSED IN THE JURISDICTION WHERE THE PROJECT IS LOCATED.
5. CONTRACTOR TO PROVIDE SUFFICIENT NOTICE TO THE OWNER'S REPRESENTATIVE PRIOR TO ANY WORK TO ALLOW ADEQUATE TIME FOR COORDINATION OF EXISTING BUILDING ACTIVITIES WITH THE CONSTRUCTION WORK.
6. CONTRACTOR TO INCLUDE IN THEIR SCOPE ALL LABOR, MATERIALS, SERVICES, APPARATUS AND SHOP DRAWINGS IN ADDITION TO THE CONTRACT DOCUMENTS AS REQUIRED TO COMPLY WITH ALL APPLICABLE GOVERNING LAWS, CODES AND JURISDICTION REQUIREMENTS. PROVIDE ELECTRICAL EQUIPMENT WITH ALL ASSOCIATED ACCESSORIES, BRANCH CIRCUIT WIRING AND CONDUIT INFRASTRUCTURE AS REQUIRED TO ENSURE A COMPLETE AND OPERATIONAL SYSTEM.
7. CONTRACTOR SHALL PROVIDE WRITTEN CERTIFICATION THAT ALL PRODUCTS, MATERIALS AND PROCESSES INSTALLED IN THE SPACE CONTAINS NO ASBESTOS OR PCB.
8. DELIVER PRODUCTS TO PROJECT SITE IDENTIFIED WITH NAMES, MODEL NUMBERS, TYPES, GRADES, COMPLIANCE LABELS, AND OTHER INFORMATION NEEDED FOR DISTINCT IDENTIFICATION; ADEQUATELY PACKAGED AND PROTECTED TO PREVENT DAMAGE DURING SHIPMENT, STORAGE, AND HANDLING. PROTECT STORED EQUIPMENT AND MATERIALS FROM DAMAGE. COMPLY WITH MANUFACTURERS RIGGING AND MOVING INSTRUCTIONS FOR UNLOADING EQUIPMENT AND MOVING INTO FINAL LOCATION.
9. ELECTRICAL PLANS ARE DIAGRAMMATIC ONLY. COORDINATE WITH EQUIPMENT VENDOR TO VERIFY EXACT LOCATION AND CONNECTION REQUIREMENTS PRIOR TO INSTALLATION.
10. ALL CONDUCTORS SHALL BE IDENTIFIED. ALL WIRING DEVICES SHALL BE USED WITH TYPED LABEL ON THE COVER PLATE IDENTIFYING THE PANEL DESIGNATION AND CIRCUIT NUMBER FROM WHICH THEY ARE FED.
11. CONTROL WIRING SHALL BE TAGGED AT EACH END AND TERMINATED WHERE WORK HAS BEEN PERFORMED IN ACCORDANCE WITH EQUIPMENT MANUFACTURES SPECIFICATIONS.
12. ALL CONNECTIONS TO DEVICES SHALL BE TAPED WITH SCOTCH 33 ELECTRICAL TAPE.
13. ALL EQUIPMENT SHALL BE "UL" LISTED.
14. ALL MATERIALS AND WORK SHALL BE ACCORDING TO BASE BUILDING SPECIFICATIONS UNLESS OTHERWISE NOTED.
15. ALL CONDUITS AND JUNCTION BOXES SHALL BE CONCEALED IN FINISHED AREAS. PRIOR TO CONCEALMENT OF NEW CONSTRUCTION, ALL WORK BEHIND FINISHED SURFACES SHALL BE INSPECTED BY THE OWNER'S REPRESENTATIVE.
16. IF MATERIAL OR EQUIPMENT IS INSTALLED BEFORE IT IS APPROVED, THE CONTRACTOR SHALL BE LIABLE FOR ITS REMOVAL AND REPLACEMENT AT NO ADDITIONAL CHARGE OR IF IN THE OPINION OF THE ARCHITECT OR ENGINEER, THE MATERIAL OR EQUIPMENT DOES NOT MEET THE INTENT OF THE DRAWINGS AND SPECIFICATIONS.
17. ALL SLAB PENETRATIONS MUST BE X-RAYED OR SCANNED WITH A RADAR PRIOR TO CORE DRILLING. OBTAIN APPROVAL FROM OWNERS REPRESENTATIVE PRIOR TO ANY CORE DRILLING.
18. PROVIDE FIRESTOPPING MATERIALS TO MAINTAIN INTEGRITY OF THE FIRE RATED CONSTRUCTION WHERE CONDUITS PASS THROUGH WALLS AND FLOORS.
19. INSTALLATION OF EQUIPMENT, COMPONENTS AND WIRING FOR ELECTRICAL SYSTEMS SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF EQUIPMENT MANUFACTURER.
20. CONTRACTORS SCOPE OF WORK INCLUDES TRACING ALL EXISTING CIRCUITS IN THE CONSTRUCTION AREA BACK TO SOURCE. IF REMOVAL OF EXISTING ELECTRICAL EQUIPMENT AFFECTS ANY EXISTING CIRCUITS, CONTRACTOR SHALL PROVIDE CIRCUIT BREAKERS, WIRING, CONDUIT, ETC. REQUIRED TO RECONNECT EXISTING-TO-REMAIN ELECTRICAL EQUIPMENT BACK TO SOURCE.
21. THE CONTINUITY OF ALL EXISTING CIRCUITS TO REMAIN SHALL BE MAINTAINED.
22. ELECTRICAL SYSTEMS SHALL BE GROUNDED PER ARTICLE 250 OF THE NATIONAL ELECTRICAL CODE.
23. PROVIDE AN INSULATED EQUIPMENT GROUNDING CONDUCTOR IN ALL BRANCH CIRCUITS AND FEEDERS INSTALLED IN RACEWAYS. THE DEDICATED EQUIPMENT GROUNDING CONDUCTOR SHALL BE SIZED PER NEC SECTION 250.122. SOLE USE OF METAL RACEWAY AS A GROUNDING CONDUCTOR SHALL NOT BE ACCEPTABLE. WIRING METHODS SHALL BE IN ACCORDANCE WITH NEC SECTION 518.4 FOR ALL ASSEMBLY AREAS.
24. ALL CONDUCTORS SHALL BE COPPER. MINIMUM SIZE SHALL BE #12 AWG. CONDUCTOR #10 AWG AND SMALLER SHALL BE SOLID. CONDUCTORS #8 AWG AND LARGER SHALL BE STRANDED. CONDUCTOR SHALL HAVE THHN/THWN-2 INSULATION OR AS NOTED.
25. PROVIDE MINIMUM 3/4" CONDUIT FOR POWER CIRCUITS.
26. TYPE MC CABLE MAY BE USED IN LIEU OF EMT FOR BRANCH CIRCUITS, IN DRYWALL PARTITION AND IN CEILING PLENUM WHERE ALLOWED BY NEC AND THE BUILDING OWNER. MC CABLE FOR ISOLATED CIRCUIT SHALL HAVE TWO (2) SEPARATE GROUNDING CONDUCTORS.
27. NUMBER OF WIRES MAY NOT BE INDICATED FOR ALL CIRCUITS, ONLY THOSE WHERE CLARIFICATION IS NECESSARY. PROVIDE ALL WIRE NECESSARY FOR THE PROPER FUNCTION OF THE SYSTEM WHETHER INDICATED ON PLAN OR NOT.
28. PROVIDE EACH CIRCUIT HOMERUN WITH A DEDICATED NEUTRAL CONDUCTOR AND INSULATED EQUIPMENT GROUNDING CONDUCTOR.
29. ELECTRICAL CONTRACTOR TO COORDINATE WITH MECHANICAL, PLUMBING AND OTHER TRADES TO PROVIDE ALL EQUIPMENT ASSOCIATED WITH THEIR RESPECTIVE TRADES WITH NECESSARY WIRING AND CONDUIT INFRASTRUCTURE FOR ALL SENSORS, CONTROL SYSTEMS AND REMOTE MOUNTED CONTROL PANELS AS REQUIRED.
30. CONTRACTOR TO PROVIDE DEDICATED CIRCUIT FOR CONNECTION TO EACH MECHANICAL, PLUMBING AND MISCELLANEOUS EQUIPMENT CONTROL PANELS AS REQUIRED. COORDINATE EXACT LOCATION AND CONNECTION REQUIREMENTS WITH MECHANICAL AND CONTROLS CONTRACTORS.
31. ALL ELECTRICAL WORK, INCLUDING BUT NOT LIMITED TO DEVICES, EQUIPMENT, CONDUITS AND BOXES IN PARKING SPACES AND DRIVE AISLES OF COVERED GARAGE AREAS MUST BE INSTALLED TO MAINTAIN A MINIMUM HEIGHT CLEARANCE OF 98 INCHES FOR HANDICAP SPACES AND 84 INCHES FOR ALL OTHER SPACES.
32. CONTRACTOR TO COORDINATE ELECTRICAL WORK TO AVOID INTERFERENCE BETWEEN ALL OTHER TRADES.
   A. DETERMINE INTERFERENCE BEFORE WORK IS FABRICATED OR INSTALLED. THE CONTRACTOR SHALL BE THOROUGHLY FAMILIAR WITH ALL DETAILS OF WORK AND WORKING CONDITIONS AND COORDINATE WORK DURING PRELIMINARY STAGES TO ENSURE ACTUAL ERECTION WILL PROCEED WITHOUT INTERFERENCE. COORDINATION IS OF PARAMOUNT IMPORTANCE AND NO REQUESTS FOR ADDITIONAL PAYMENT WILL BE CONSIDERED WHERE REQUEST IS BASED ON INTERFERENCE.
   B. WHERE JOB CONDITIONS REQUIRE REASONABLE DEVIATIONS FROM CONTRACT DOCUMENTS, MAKE DEVIATIONS WITHOUT ADDITIONAL COST TO OWNER, AFTER OBTAINING APPROVAL OF ARCHITECT.
   C. PROVIDE MAXIMUM PRACTICAL SPACE FOR OPERATION, REPAIR, REMOVAL, AND TESTING OF ELECTRICAL EQUIPMENT. APPROVED DEVIATIONS MAY BE MADE TO PROVIDE REQUIRED ACCESSIBILITY.
   D. KEEP CONDUITS, WIREWAYS AND SIMILAR ITEMS AS CLOSE AS POSSIBLE TO CEILING, WALLS AND COLUMNS IN ORDER TO TAKE UP MINIMUM AMOUNT OF SPACE. ALL WORK TO BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER.
   E. PROVIDE OFFSETS, FITTINGS AND SIMILAR ITEMS NECESSARY TO ACCOMPLISH REQUIREMENTS OF COORDINATION WITHOUT ADDITIONAL EXPENSE TO OWNER.
   F. PROVIDE ACCESS TO AND CLEARANCES AROUND EQUIPMENT AS REQUIRED BY THE N.E.C.
33. TESTING:
   A. TEST AND ADJUST EQUIPMENT AND SYSTEMS INSTALLED AND DEMONSTRATE PROPER OPERATION TO OWNER'S REPRESENTATIVE. NO EQUIPMENT SHALL BE TESTED OR OPERATED FOR ANY PURPOSE UNTIL IT HAS BEEN FULLY PREPARED FOR OPERATION IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
   B. SHOW, BY DEMONSTRATION IN SERVICE, THAT ALL CIRCUITS AND DEVICES ARE IN GOOD OPERATING CONDITION. EACH PIECE OF EQUIPMENT AND COMPONENT OF THE ELECTRICAL SYSTEM SHALL FUNCTION NOT LESS THAN FIVE TIMES IN COURSE OF THE ACCEPTANCE TESTS.

120V BRANCH CIRCUIT WIRING CONDUCTOR SIZE

DEPENDING ON BRANCH CIRCUIT RUN LENGTH FROM PANELBOARD TO THE LAST DEVICE ON THE BRANCH CIRCUIT, THE CONTRACTOR SHALL INCREASE THE BRANCH CIRCUIT WIRE SIZE AS PER THE TABLE BELOW.

MAXIMUM #10 WIRE SHALL BE USED FOR GENERAL RECEPTACLE CIRCUIT WIRING.

LENGTH (FEET)	VOLTAGE (V)	AMPACITY (A)	WIRE SIZE (AWG TYP.)
0-66	120	20	#12
0-102	120	20	#10

ELECTRICAL GENERAL DEMOLITION NOTES

1. GENERAL:
   A. BEFORE SUBMITTING THEIR BID, THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR VISITING THE SITE TO VERIFY THE EXISTING CONDITIONS AND SCOPE OF WORK AREA. NO CONSIDERATION OR ALLOWANCE WILL BE GRANTED FOR FAILURE TO VISIT THE SITE, NOR FOR ANY ALLEGED MISUNDERSTANDING OF WORK TO BE PERFORMED. THE CONTRACTOR SHALL INCLUDE IN HIS BID PRICE ALL LABOR AND MATERIAL THAT MAY AFFECT HIS WORK.
   B. THE GENERAL EXTENT OF EXISTING ELECTRICAL WORK TO BE DISMANTLED AND REMOVED OR RELOCATED IS INDICATED ON THE DRAWINGS.
   C. ALL COMPONENTS ASSOCIATED WITH SYSTEMS AND EQUIPMENT TO BE REMOVED OR RELOCATED MAY NOT BE SPECIFICALLY INDICATED. REMOVE ALL ASSOCIATED ELECTRICAL ACCESSORIES AND COMPONENTS INCLUDING BUT NOT LIMITED TO HANGERS, WIRING, CONDUIT, BOXES AND ALL ADDITIONAL MISCELLANEOUS ITEMS RELATED TO THE EXISTING EQUIPMENT INDICATED TO BE REMOVED OR RELOCATED. REMOVE ALL ASSOCIATED WIRING AND CONDUIT BACK TO THE SOURCE OF SUPPLY IN EXISTING CIRCUITS WHICH ARE TO BE DEMOLISHED. UNLESS SPECIFICALLY INDICATED, NO EQUIPMENT, MATERIALS OR ASSOCIATED COMPONENTS SHALL BE ABANDONED IN PLACE.
   D. ABANDON ALL CONDUITS CONCEALED IN CONCRETE WALLS OR SLABS. REMOVE ALL WIRING FROM ABANDONED CONDUITS BACK TO SOURCE OF SUPPLY.
2. DISPOSAL OF DEMOLITION:
   A. CONTRACTOR SHALL CLEAN THE PROJECT SITE AT THE END OF EACH WORKING DAY. NOTIFY THE BUILDING OWNER PRIOR TO DISPOSAL OF DEMOLISHED MATERIALS TO ALLOW SALVAGE OF ANY USABLE MATERIALS. AFTER INSPECTION FROM THE OWNERS REPRESENTATIVE, ALL UNUSED MATERIALS SHALL BE REMOVED FROM THE JOB SITE WITH DISPOSAL IN ACCORDANCE WITH APPLICABLE SPECIFICATIONS AND REGULATIONS.
3. PROTECTION:
   A. PROTECT FROM DAMAGE ALL EXISTING EQUIPMENT, DEVICES AND MATERIALS TO REMAIN. ANY EXISTING MATERIALS AND EQUIPMENT DAMAGED DURING THE COURSE OF THE CONSTRUCTION PROCESS SHALL BE REPLACED WITH MATERIALS AND EQUIPMENT CONFORMING TO EXISTING SPECIFICATIONS AT NO ADDITIONAL COST TO THE OWNER.
4. TERMINATION AND PATCHING:
   A. DISCONNECT EXISTING EQUIPMENT AND DEVICES WITH ASSOCIATED ACCESSORIES, CONDUIT AND WIRING BACK TO SOURCE OF SUPPLY.
   B. WHERE EXISTING FLOORS, WALLS AND ROOFS MUST BE CUT OR ARE DAMAGED DURING THE CONSTRUCTION PROCESS, PATCH THE CUT OR DAMAGED AREAS TO MATCH THE ADJACENT CONSTRUCTION.
   C. THE CONTINUITY OF ALL EXISTING CONDUITS AND FEEDERS SERVICING AREAS AND EQUIPMENT TO REMAIN SHALL BE MAINTAINED. MODIFY THE EXISTING CIRCUITS IF REQUIRED IN ORDER TO MAINTAIN THE EXISTING CIRCUITRY.

ELECTRICAL SYMBOL LIST

(STANDARD SYMBOLS, ALL SYMBOLS MAY NOT APPEAR ON THE DRAWINGS)

1. REFER TO THE LIGHTING FIXTURE SCHEDULE ON DRAWING E701 FOR LIGHTING FIXTURE SPECIFICATIONS.

- TYPICAL EXTERIOR LIGHTING FIXTURES
- WALL/CEILING/FLOOR MOUNTED JUNCTION BOX
- NON-FUSIBLE DISCONNECT SWITCH
- FUSIBLE DISCONNECT SWITCH
- COMBINATION STARTER DISCONNECT SWITCH
- KEYED DRAWING NOTE
- EQ-XX — EQUIPMENT TAG, REFER TO EQUIPMENT SCHEDULES FOR EQUIPMENT DESCRIPTION
- $_M — MOTOR RATED SWITCH WITH THERMAL OVERLOAD CURRENT PROTECTION, MOUNTED @ 48" AFF OR UNIT MOUNTED
- 120/208V ELECTRICAL PANEL

ABBREVIATIONS

(STANDARD ABBREVIATIONS, ALL ABBREVIATIONS MAY NOT APPEAR ON THE DRAWINGS)

A	AMPERE
ADA	AMERICANS WITH DISABILITIES ACT
AF	FUSE RATING IN AMPS
AFF	ABOVE FINISHED FLOOR
AHJ	AUTHORITY HAVING JURISDICTION
AL	ALUMINUM
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS
AT	TRIP RATING IN AMPS
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
C	CONDUIT
CB	CIRCUIT BREAKER
CU	COPPER
D	EXISTING TO BE DEMOLISHED
DISC. SW.	DISCONNECT SWITCH
DIV.	DIVISION
DWG	DRAWING
E. EX	EXISTING TO REMAIN
ER	EXISTING AND REINSTALLED
EM	DEVICE ON EMERGENCY CIRCUIT
EMT	ELECTRICAL METALLIC TUBING
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FASP	FIRE ALARM SMOKE PURGE PANEL
FATC	FIRE ALARM TERMINAL CABINET
FLA	FULL LOAD AMPS
FSS	FUSIBLE SAFETY SWITCH
G	GROUND
GFI	GROUND FAULT INTERRUPTER
GRS	GALVANIZED RESISTIVE CONDUIT
HP	HORSE POWER
HVAC	HEATING, VENTILATION AND AIR CONDITIONING
HWH	HOT WATER HEATER
HZ	HERTZ
IBC	INTERNATIONAL BUILDING CODE
IG	ISOLATED GROUND
IECC	INTERNATIONAL ENERGY CONSERVATION CODE
IESNA	ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA
KCMIL	THOUSANDS OF CIRCULAR MILS
KVA	KILOVOLT-AMPS
KW	KILOWATT
LM	LUMEN
LTG	LIGHTING
MCA	MINIMUM CIRCUIT AMPS
MCB	MAIN CIRCUIT BREAKER
MDP	MAIN DISTRIBUTION PANEL
MISC	MISCELLANEOUS
MLO	MAIN LUGS ONLY
MOCP	MAXIMUM OVERCURRENT PROTECTION
N	NEW
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NFSS	NON FUSED SAFETY SWITCH
NL	NIGHT LIGHT FIXTURE
NTS	NOT TO SCALE
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
P	POLE
PH, Ø	PHASE
PNL	PANEL
R	RELOCATED AT NEW LOCATION
REC	RECEPTACLE
RR	REMOVE AND REINSTALL
S/N	SOLID NEUTRAL
SPD	SURGE PROTECTIVE DEVICE
SWBD	SWITCHBOARD
T, XFMR	TRANSFORMER
TYP.	TYPICAL
UL	UNDERWRITER'S LABORATORIES
UON	UNLESS OTHERWISE NOTED
V	VOLTS
VFD	VARIABLE FREQUENCY DRIVE
W	WATTS
WP	WEATHERPROOF

ELECTRICAL DRAWING LIST

SHEET	DRAWING	TITLE
1	E-001	GENERAL NOTES, SYMBOLS & ABBREVIATIONS
2	ED-101	ROOF PLAN - ELECTRICAL DEMOLITION AREA A1
3	ED-102	ROOF PLAN - ELECTRICAL DEMOLITION AREA A2
4	E-101	ROOF PLAN - ELECTRICAL NEW WORK AREA A1
5	E-102	ROOF PLAN - ELECTRICAL NEW WORK AREA A2
6	E-601	ELECTRICAL SCHEDULES
7	E-701	ELECTRICAL DETAILS
8	E-801	LIGHTNING PROTECTION PLAN
9	E-802	LIGHTNING PROTECTION DETAILS
10	E-803	LIGHTNING PROTECTION DETAILS

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12/29/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND — SAMIRA MUKHTAR SETTY — No. 50803 — PROFESSIONAL ENGINEER — 12/29/2023

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland. License No. 50803, Expiration Date 04/13/2025.

SHEET TITLE
GENERAL NOTES, SYMBOLS & ABBREVIATIONS

DRAWN BY EM | CHECKED BY SM

SET DESCRIPTION 100% CONSTRUCTION DOCUMENTS

DATE 12/29/2023

SHEET NO **E-001**

E SHEET 01 OF 10

SHEET KEY NOTES

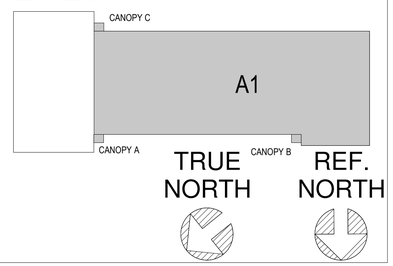
1. ELECTRICAL CONTRACTOR TO DISCONNECT POWER TO EQUIPMENT BEING REMOVED TEMPORARILY. ASSOCIATED OVERCURRENT PROTECTION EQUIPMENT TO REMAIN AND CAP EXISTING WIRING FOR RECONNECTION. (TYPICAL.)
2. DEMOLISH THE EXISTING CANOPY LIGHT FIXTURE.

GENERAL NOTES

1. REFER TO THE ELECTRICAL COVER SHEET DRAWING FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.
2. REFER TO MECHANICAL AND PLUMBING DEMOLITION DRAWINGS FOR ADDITIONAL EQUIPMENT TO BE DEMOLISHED.
3. ALL EXISTING DEVICES TO REMAIN ARE TO BE PROTECTED FROM DAMAGE THROUGHOUT THE CONSTRUCTION PROCESS.
4. THE CONTINUITY OF EXISTING CIRCUITS SERVING EXISTING DEVICES AND EQUIPMENT TO REMAIN SHALL BE MAINTAINED.
5. UNLESS OTHERWISE NOTED, IN THE SCOPE OF WORK AREA, ALL ELECTRICAL DEVICES SHOWN WITH A DASHED LINE INDICATE EXISTING EQUIPMENT TO BE DEMOLISHED AND REMOVED AND REINSTALLED. DEVICES SHOWN WITH A CONTINUOUS LINE INDICATE EXISTING EQUIPMENT TO REMAIN.

1 / ED-101 ROOF PLAN - ELECTRICAL DEMOLITION AREA A1
1/8" = 1'-0"
0 4' 8' 16'

KEY PLAN



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PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · SUSANNA MOSKEVITZ · 50803 · PROFESSIONAL ENGINEER · 12/29/2023

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland.
License No. 50803, Expiration Date 04/13/2025

SHEET TITLE
ROOF PLAN - ELECTRICAL DEMOLITION AREA A1

DRAWN BY	CHECKED BY	SHEET NO
NA	SM	ED-101

SET DESCRIPTION: 100% CONSTRUCTION DOCUMENTS
DATE: 12/29/2023

STAPLE EDGE

1 2 3 4

D

C

B

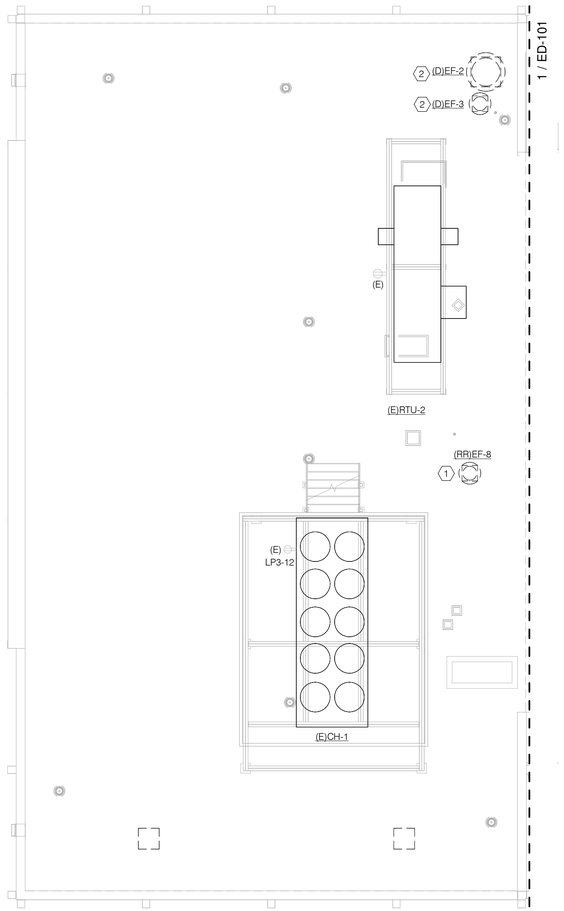
A

SHEET KEY NOTES

1. ELECTRICAL CONTRACTOR TO DISCONNECT POWER TO EQUIPMENT BEING REMOVED TEMPORARILY. ASSOCIATED OVERCURRENT PROTECTION EQUIPMENT TO REMAIN AND CAP EXISTING WIRING FOR RECONNECTION. (TYPICAL.)
2. ELECTRICAL CONTRACTOR TO DISCONNECT POWER TO EQUIPMENT BEING REMOVED AND CAP EXISTING WIRING FOR RECONNECTION TO NEW MECHANICAL UNIT. ASSOCIATED OVERCURRENT PROTECTION AND OTHER ELECTRICAL COMPONENTS TO REMAIN. SEE SHEET E-101 FOR NEW ELECTRICAL WORK.

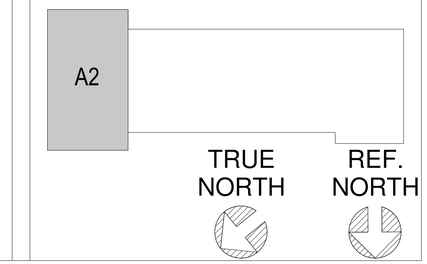
GENERAL NOTES

1. REFER TO THE ELECTRICAL COVER SHEET DRAWING FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.
2. REFER TO MECHANICAL AND PLUMBING DEMOLITION DRAWINGS FOR ADDITIONAL EQUIPMENT TO BE DEMOLISHED.
3. ALL EXISTING DEVICES TO REMAIN ARE TO BE PROTECTED FROM DAMAGE THROUGHOUT THE CONSTRUCTION PROCESS.
4. THE CONTINUITY OF EXISTING CIRCUITS SERVING EXISTING DEVICES AND EQUIPMENT TO REMAIN SHALL BE MAINTAINED.
5. UNLESS OTHERWISE NOTED, IN THE SCOPE OF WORK AREA, ALL ELECTRICAL DEVICES SHOWN WITH A DASHED LINE INDICATE EXISTING EQUIPMENT TO BE DEMOLISHED AND REMOVED AND REINSTALLED. DEVICES SHOWN WITH A CONTINUOUS LINE INDICATE EXISTING EQUIPMENT TO REMAIN.



1 ED-102 ROOF PLAN - ELECTRICAL DEMOLITION AREA A2
1/8" = 1'-0"
0 4' 8' 16'

KEY PLAN



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301-203-1784

REVISIONS

DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/29/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · SUMAN MOHAN REDDY · No. 50803 · PROFESSIONAL ENGINEER
12/29/2023

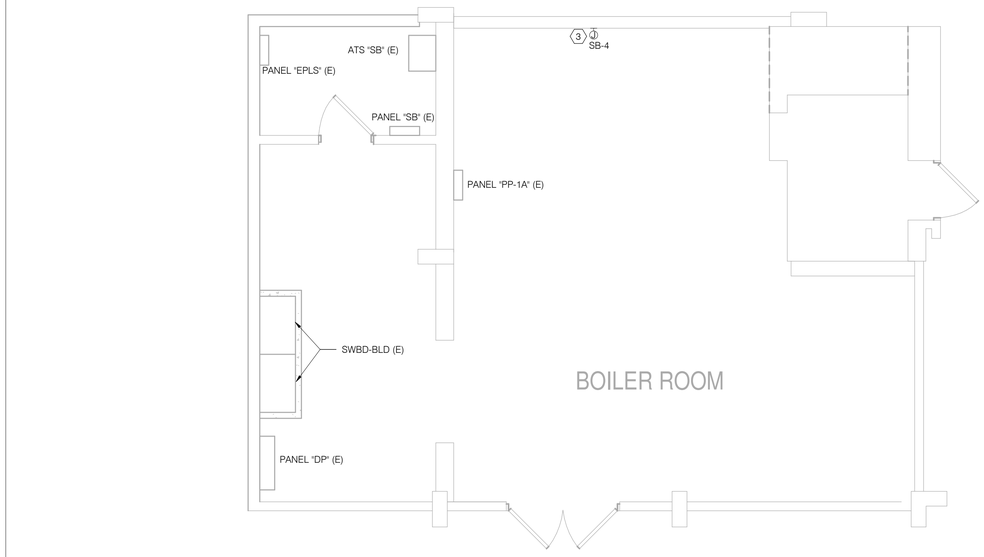
PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland.
License No. 50803, Expiration Date 04/13/2025

SHEET TITLE
ROOF PLAN - ELECTRICAL DEMOLITION AREA A2

DRAWN BY	CHECKED BY	SHEET NO
NA	SM	ED-102

SET DESCRIPTION
100% CONSTRUCTION DOCUMENTS

DATE
12/29/2023



2 / E-101 ENLARGED PLAN - BOILER ROOM LOWER LEVEL
1/4" = 1'-0" 0 6" 1' 2'

1 / E-101 ROOF PLAN - ELECTRICAL NEW WORK AREA A1
1/8" = 1'-0" 0 4' 8' 16'

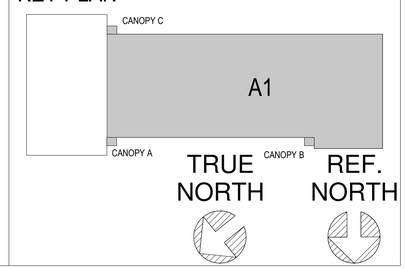
SHEET KEY NOTES

1. ELECTRICAL CONTRACTOR TO RECONNECT EXISTING POWER CIRCUIT INCLUDING ALL ASSOCIATED WIRING TO EQUIPMENT BEING REINSTALLED.
2. CONNECT NEW LIGHT FIXTURE TO EXISTING LIGHTING CIRCUIT PREVIOUSLY SERVING THIS AREA AND MAINTAIN EXISTING CONTROL SYSTEM.
3. ELCTRICAL CONTRACTOR TO COORDINATE WITH PLUMBING CONTRACTOR FOR HEAT TRACE AND CONNECT THE JUNCTION BOX TO SPARE CIRCUIT #SB-4 IN THE PANEL "SB" LOCATED IN THE BOILER ROOM. CONTRACTOR TO ENSURE THAT THE TOTAL LOAD ON CIRCUIT DOES NOT EXCEED 16A PER 20A RATED CIRCUIT.

GENERAL NOTES

1. REFER TO THE ELECTRICAL COVER SHEET DRAWING FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.
2. REFER TO ARCHITECTURAL DRAWINGS TO VERIFY THE ELEVATIONS, DETAILS, LOCATION, MOUNTING HEIGHTS AND ADDITIONAL INFORMATION PRIOR TO THE ROUGH-IN OF ELECTRICAL OUTLETS AND DEVICES.
3. COORDINATE WITH CONTRACT DOCUMENTS FOR ALL OTHER DISCIPLINES AND TRADES FOR EXACT LOCATION OF ASSOCIATED EQUIPMENT.
4. THE CONTINUITY OF EXISTING CIRCUITS SERVING EXISTING DEVICES AND EQUIPMENT TO REMAIN SHALL BE MAINTAINED.
5. ALL REUSED CIRCUIT NUMBERS INDICATED ON PLAN ARE BASED ON EXISTING DOCUMENTS AND MAY NOT MATCH THE AS-BUILT CONDITION OF THE EXISTING CIRCUITS SERVING THE AREA. CONTRACTOR TO VERIFY AND UPDATE THE CIRCUIT NUMBERS UTILIZED DURING CONSTRUCTION.
6. UNLESS OTHERWISE NOTED, IN THE SCOPE OF WORK AREA, ALL ELECTRICAL OUTLETS AND DEVICES SHOWN WITH A SUBSCRIPT "N" OR WITHOUT ANY SUBSCRIPT ARE NEW TO BE PROVIDED. DEVICES SHOWN WITH A SUBSCRIPT "E" INDICATE EXISTING EQUIPMENT TO REMAIN.

KEY PLAN



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PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · SANJU MODEKURTY · 50803 · PROFESSIONAL ENGINEER
12/29/2023

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland.
License No. 50803, Expiration Date 04/13/2025

SHEET TITLE
ROOF PLAN - ELECTRICAL NEW WORK AREA A1

DRAWN BY	CHECKED BY	SHEET NO
NA	SM	E-101

SET DESCRIPTION
100% CONSTRUCTION DOCUMENTS

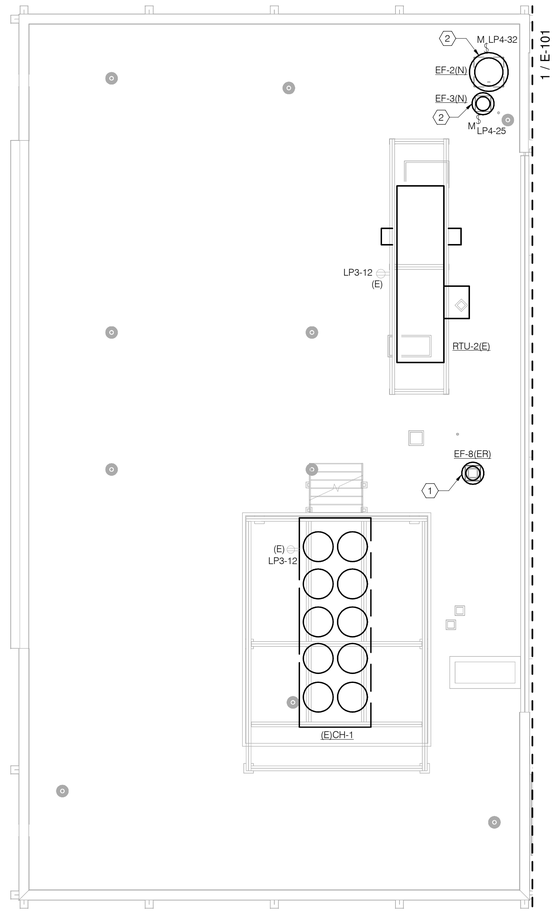
DATE
12/29/2023

SHEET KEY NOTES

1. ELECTRICAL CONTRACTOR TO RECONNECT EXISTING POWER CIRCUIT INCLUDING ALL ASSOCIATED WIRING TO EQUIPMENT BEING REINSTALLED.
2. ELECTRICAL CONTRACTOR TO CONNECT EXISTING FEEDER PREVIOUSLY SERVING EQUIPMENT BEING REMOVED TO NEW EQUIPMENT BEING INSTALLED. EXTEND EXISTING FEEDER AND ASSOCIATED OVERCURRENT PROTECTION AND OTHER ELECTRICAL COMPONENTS AS NECESSARY. REQUIRED POWER CONNECTION FOR NEW EQUIPMENT SHALL BE THE SAME AS EQUIPMENT BEING REMOVED.

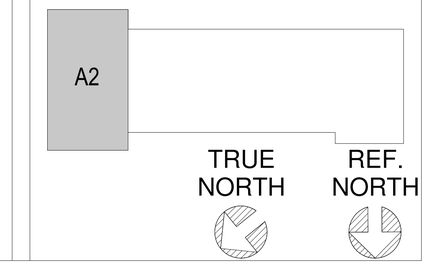
GENERAL NOTES

1. REFER TO THE ELECTRICAL COVER SHEET DRAWING FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.
2. REFER TO ARCHITECTURAL DRAWINGS TO VERIFY THE ELEVATIONS, DETAILS, LOCATION, MOUNTING HEIGHTS AND ADDITIONAL INFORMATION PRIOR TO THE ROUGH-IN OF ELECTRICAL OUTLETS AND DEVICES.
3. COORDINATE WITH CONTRACT DOCUMENTS FOR ALL OTHER DISCIPLINES AND TRADES FOR EXACT LOCATION OF ASSOCIATED EQUIPMENT.
4. THE CONTINUITY OF EXISTING CIRCUITS SERVING EXISTING DEVICES AND EQUIPMENT TO REMAIN SHALL BE MAINTAINED.
5. ALL REUSED CIRCUIT NUMBERS INDICATED ON PLAN ARE BASED ON EXISTING DOCUMENTS AND MAY NOT MATCH THE AS-BUILT CONDITION OF THE EXISTING CIRCUITS SERVING THE AREA. CONTRACTOR TO VERIFY AND UPDATE THE CIRCUIT NUMBERS UTILIZED DURING CONSTRUCTION.
6. UNLESS OTHERWISE NOTED, IN THE SCOPE OF WORK AREA, ALL ELECTRICAL OUTLETS AND DEVICES SHOWN WITH A SUBSCRIPT "N" OR WITHOUT ANY SUBSCRIPT ARE NEW TO BE PROVIDED. DEVICES SHOWN WITH A SUBSCRIPT "E" INDICATE EXISTING EQUIPMENT TO REMAIN.



1 E-102 ROOF PLAN - ELECTRICAL NEW WORK AREA A2
1/8" = 1'-0"
0 4' 8' 16'

KEY PLAN



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SHEET TITLE
ROOF PLAN - ELECTRICAL NEW WORK AREA A2

DRAWN BY	CHECKED BY	SHEET NO
NA	SM	E-102

SET DESCRIPTION
100% CONSTRUCTION DOCUMENTS

DATE
12/29/2023

LIGHTING FIXTURE SCHEDULE

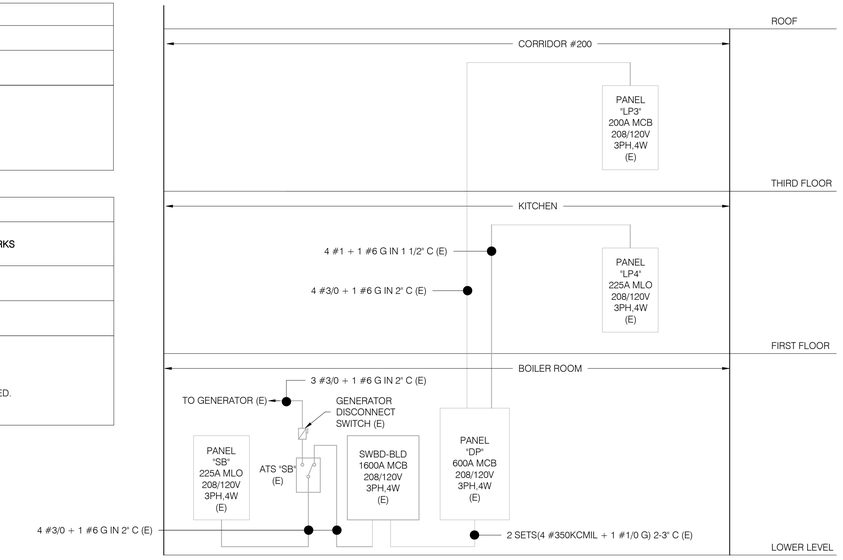
TYPE	SYMBOL	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LUMENS	LAMP	VOLTAGE	REMARKS
A	◯	6" ROUND SHALLOW DOWNLIGHT LED LIGHT FIXTURE PROVIDE WITH INTEGRAL BATTERY FOR BACK UP	PORTFOLIO LIGHTING	LDS6C-02-20-90-35K-D010-S-0-WH-EMBOD6ST	2000 LM	20W LED	UNV	

NOTES:
1. PROVIDE FIXTURES WITH ALL NECESSARY ACCESSORIES TO ENSURE A COMPLETE AND OPERATIONAL SYSTEM.
2. COORDINATE WITH ARCHITECT FOR ALL FIXTURE FINISHES, LENS ACCESSORIES, CEILING TYPE AND MOUNTING REQUIREMENTS.
3. CONDUCTOR SIZE FEEDING ALL EMERGENCY LIGHT FIXTURES SHALL BE #10 AWG, OR SHALL MATCH EXISTING CONDUCTOR SIZE.
4. UNLESS OTHERWISE NOTED ON PLAN, ALL EMERGENCY LIGHT FIXTURES SHALL BE PROVIDED WITH INTEGRAL BATTERY FOR BACK UP.

MECHANICAL EQUIPMENT ELECTRICAL CONNECTION SCHEDULE (FOR REFERENCE ONLY)

UNIT MARK	UNIT DESCRIPTION	VOLTAGE/ PHASE	HP	LOAD KW	FLA	MCA	MOCP IN PANEL	UNIT DISCONNECT SWITCH			FEEDER	REMARKS
								SIZE	TYPE	FURNISHED BY		
EF-2	EXHAUST FAN	120/1	3/4	-	13.8	17.25	30	-	SM	DIV. 26	2 #10 + 1 #10 G IN 3/4" C	
EF-3	EXHAUST FAN	120/1	1/6	-	2.67	3.34	20	-	SM	DIV. 26	2 #12 + 1 #12 G IN 3/4" C	

ABBREVIATIONS: SM - MOTOR RATED SWITCH; NFSS - NON FUSED SAFETY SWITCH; FSS - FUSED SAFETY SWITCH; VFD - VARIABLE FREQUENCY DRIVE
NOTES:
1. ALL OUTDOOR DISCONNECT SWITCHES SHALL BE IN NEMA 3R ENCLOSURE TYPE, UNLESS OTHERWISE NOTED.
2. ALL FUSE SIZES FOR EQUIPMENT DISCONNECT SWITCH SHALL BE BASED ON THE EQUIPMENT NAME PLATE DATA AND EQUIPMENT MANUFACTURER RECOMMENDATIONS.
3. CONTRACTOR TO PROVIDE ELECTRICAL CONNECTIONS FOR ALL ASSOCIATED CONDENSATE PUMP, CONTROL PANEL, ALARM AND MISCELLANEOUS ACCESSORY DEVICES SERVING EQUIPMENT AS REQUIRED.
4. ALL FUSES SHALL BE DUAL ELEMENT TYPE.



1 / E-601 EXISTING POWER RISER (FOR REFERENCE ONLY)
NTS

GENERAL NOTES

1. UNLESS OTHERWISE NOTED, ALL ELECTRICAL EQUIPMENT, PANELS AND FEEDERS ARE EXISTING TO REMAIN AND SHOWN FOR REFERENCE ONLY.
2. TURN ALL SPARE CIRCUIT BREAKERS TO "OFF" POSITION AT COMPLETION OF WORK.
3. AT COMPLETION OF THE PROJECT, PROVIDE TYPE WRITTEN SCHEDULES FOR ALL PANEL BOARDS UTILIZED DURING THE CONSTRUCTION PROCESS INDICATING AS-BUILT CONDITIONS.
4. ALL REUSED CIRCUIT NUMBERS INDICATED ON PLAN ARE BASED ON EXISTING DOCUMENTS AND MAY NOT MATCH THE ACTUAL AS-BUILT CONDITION OF THE EXISTING CIRCUITS SERVING THE AREA. CONTRACTOR TO VERIFY THE EXACT CIRCUIT NUMBERS DURING CONSTRUCTION.
5. ALL NEW CIRCUIT BREAKERS WHERE PROVIDED MUST BE COMPATIBLE WITH THE EXISTING PANEL BOARD AND SHALL MATCH THE EXISTING UL LISTING, MANUFACTURER MAKE AND AIC RATING.

PROJECT: ROOF REPLACEMENT AT MT. WASHINGTON SCHOOL #221 — **PANEL VOLTAGE:** 120/208V — **AIC RATING:** 10K
PANEL: LP3 (E) — **PHASE & WIRE:** 3PH, 4W — **MOUNTING:** RECESSED
LOCATION: THIRD FLOOR- CORRIDOR 200 — **BUS/MAIN (AMPS):** 200A MCB — **NEMA TYPE:** 1

CKT NO.	OCD A	OCD P	DESCRIPTION	LOAD (KVA) MISC	HWH	HVAC	REC	LTG	3 PH SEQUENCE A	B	C	LOAD (KVA) MISC	HWH	HVAC	REC	LTG	DESCRIPTION	OCD A	OCD P	CKT NO.
1	20	1	REC. GF ACCU-1, RTU (E)				1.2		2.4						1.2		REC. MUSIC RM. (E)	20	1	20
2	20	1	EXISTING LOAD	1.2						2.4					1.2		REC. WORK RM. (E)	20	1	21
3	20	1	EXISTING LOAD	1.2							2.4				1.2		REC. RM. 212 (E)	20	1	22
4	20	1	EXISTING LOAD	1.2					2.4						1.2		REC. LIBRARY (E)	20	1	23
5	20	1	EXISTING LOAD	1.2						2.4					1.2		REC. COR. 213 (E)	20	1	24
6	20	1	EXISTING LOAD	1.2							2.4				1.2		REC. CL. 206 (E)	20	1	25
7	20	1	EXISTING LOAD	1.2					2.4						1.2		REC. CL. 206 (E)	20	1	26
8	20	1	EXISTING LOAD	1.2						2.4		1.2					TIME CLOCK RM. 209 (E)	20	1	27
9	20	1	EXISTING LOAD	1.2							2.4	1.2					TIME CLOCK RM. 203 (E)	20	1	28
10	20	1	EXISTING LOAD	1.2					2.4			1.2					EXISTING LOAD	20	1	29
11	20	1	REC. GFI CH-1, RTU-2 ROOF TOP				1.2			2.4		1.2					EXISTING LOAD	20	1	30
12	20	1	EXISTING LOAD	1.2							2.4	1.2					EXISTING LOAD	20	1	31
13	20	1	REC. GFI ROOF TOP 1				0.2		1.4			1.2					EXISTING LOAD	20	1	32
14	20	1	EXISTING LOAD	1.2						2.4		1.2					EXISTING LOAD	20	1	33
15	20	1	EXISTING LOAD	1.2							2.4	1.2					EXISTING LOAD	20	1	34
16	20	1	EXISTING LOAD	1.2					2.4			1.2					EXISTING LOAD	20	1	35
17	20	1	EXISTING LOAD	1.2						2.4		1.2					EXISTING LOAD	20	1	19
18	15	2	EXISTING LOAD	1.5							2.7	1.2					EXISTING LOAD	20	1	8
	/	/	/	1.5					2.7			1.2					EXISTING LOAD	20	1	22
			BUSSED SPACE							1.2		1.2					EXISTING LOAD	20	1	36
			BUSSED SPACE								0.0						BUSSED SPACE			
CONNECTED LOAD (KVA)				19.8	0.0	0.0	2.6	0.0	16.1	15.8	14.7	15.6	0.0	0.0	8.4	0.0				
25% OF LARGEST MOTOR (KVA)																				
TOTAL CONNECTED LOAD (KVA)				35.4	0.0	0.0	11.0	0.0												
DEMAND FACTOR				1.0	1.25	1.0	X	1.25									TOTAL DEMAND (KVA)	45		
TOTAL DEMAND LOAD (KVA)				35.4	0.0	0.0	10.5	0.0									LINE CURRENT (AMPS)	127		

X= 1ST 10KVA @ 100%, + REMAINDER @ 50% (N.E.C. 220-44) — HWH - HOT WATER HEATER
1 PROVIDE NEW CIRCUIT BREAKER

PROJECT: ROOF REPLACEMENT AT MT. WASHINGTON SCHOOL #221 — **PANEL VOLTAGE:** 120/208V — **AIC RATING:** 10K
PANEL: LP4 (E) — **PHASE & WIRE:** 3PH, 4W — **MOUNTING:** RECESSED
LOCATION: KITCHEN - FIRST FLOOR — **BUS/MAIN (AMPS):** 225 MLO — **NEMA TYPE:** 1

CKT NO.	OCD A	OCD P	DESCRIPTION	LOAD (KVA) MISC	HWH	HVAC	REC	LTG	3 PH SEQUENCE A	B	C	LOAD (KVA) MISC	HWH	HVAC	REC	LTG	DESCRIPTION	OCD A	OCD P	CKT NO.
1	20	1	LTG. KITCHEN (E)					1.2	2.4			1.2					RESET RELAY CONTROL PANEL (E)	20	1	16
2	20	1	LTG. KITCHEN (E)					1.2		1.2							SPARE	15	1	17
3	20	1	LTG. KITCHEN (E)					1.2			2.2				1.0		REC. DIET OG ELECT., SLIC, MECH (E)	20	1	18
4	20	1	LTG. CAFE (E)					1.2	2.4			1.2					EXISTING LOAD	20	1	19
5	20	1	LTG. CAFE (E)					1.2		2.0		0.8					SMOKE DETECTOR (E)	20	1	20
6	20	1	LTG. CAFE (E)					1.2			2.4		1.2				STEAM TABLE (E)	20	1	21
7	20	1	LTG. CAFE (E)					1.2	2.1			0.9					EXISTING LOAD	15	1	22
8	20	1	LTG. RM #14, #16, #17 (E)					1.2		2.2		1.0					SOUTHBEND OVENS (E)	20	1	23
9	20	1	LTG. RM #19 (E)					1.2			2.2	1.0					MICROWAVE/OVEN (E)	20	1	24
10	20	1	LTG. RM #12 (E)					1.2	1.5			0.3					DISHWASHER - EXHAUST FAN (E)	20	1	25
11	15	1	PELER (E)	0.9						2.1		1.2					EXISTING LOAD	20	1	26
12	20	1	STEAM TABLE (E)		1.2						2.4	1.2					EXISTING LOAD	20	1	27
13	20	1	REC. TABLE (E)				1.5		2.7			1.2					EXISTING LOAD	20	1	28
14	15	3	EXISTING LOAD	1.8						3.0		1.2					EXISTING LOAD	20	1	29
	/	/	/	1.8							4.8	3.0					EXISTING LOAD	30	2	30
	/	/	/	1.8					4.8			3.0					/	/	/	
15	15	3	EXISTING LOAD	1.8						3.6		1.8					EXISTING LOAD	15	3	31
	/	/	/	1.8							3.6	1.8					/	/	/	
	/	/	/	1.8					3.6			1.8					/	/	/	
			BUSSED SPACE							1.7		1.7					EF-2 (N) 1	30	1	32
			BUSSED SPACE								0.0						BUSSED SPACE			
CONNECTED LOAD (KVA)				11.7	1.2	0.0	1.5	12.0	19.5	15.8	17.6	24.3	1.2	0.0	1.0	0.0				
25% OF LARGEST MOTOR (KVA)																				
TOTAL CONNECTED LOAD (KVA)				36.0	2.4	0.0	2.5	12.0												
DEMAND FACTOR				1.0	1.25	1.0	X	1.25									TOTAL DEMAND (KVA)	56		
TOTAL DEMAND LOAD (KVA)				36.0	3.0	0.0	2.5	15.0									LINE CURRENT (AMPS)	157		

X= 1ST 10KVA @ 100%, + REMAINDER @ 50% (N.E.C. 220-44) — HWH - HOT WATER HEATER
1 PROVIDE NEW CIRCUIT BREAKER

PROJECT: ROOF REPLACEMENT AT MT. WASHINGTON SCHOOL #221 — **PANEL VOLTAGE:** 120/208V — **AIC RATING:** 10K
PANEL: SB (E) — **PHASE & WIRE:** 3PH, 4W — **MOUNTING:** RECESSED
LOCATION: LOWER LEVEL- BOILER ROOM — **BUS/MAIN (AMPS):** 225 MLO — **NEMA TYPE:** 1

CKT NO.	OCD A	OCD P	DESCRIPTION	LOAD (KVA) MISC	HWH	HVAC	REC	LTG	3 PH SEQUENCE A	B	C	LOAD (KVA) MISC	HWH	HVAC	REC	LTG	DESCRIPTION	OCD A	OCD P	CKT NO.
1	20	1	GENERATOR BLOCK HEATER (E)		1.2				2.4				1.2				HEAT TRACE CRAWL SPACE(E)	20	1	2
3	20	1	GENERATOR BAMEEY HEATER (E)		1.2					2.4			1.2				HEAT TRACE BOILER RM	20	1	4
5	20	1	SPARE								0.0						SPARE	20	1	6
7	20	1	SPARE						0.0								SPARE	20	1	8
9	20	1	SPARE							0.0							SPARE	20	1	10
11	20	3	EXISTING LOAD	1.2							1.2						SPARE	20	1	12
13	/	/	/	1.2					1.2								SPARE	20	1	14
15	/	/	/	1.2						1.2							SPARE	20	1	16
17	20	1	SPARE								0.0						SPARE	20	1	18
19	20	1	SPARE						0.0								SPARE	20	1	20
21	20	1	SPARE							1.2		1.2					EXISTING LOAD	20	1	22
23	20	1	SPARE								0.0						SPARE	20	1	24
25	20	1	SPARE						0.0								SPARE	20	1	26
27	20	1	SPARE							0.0							SPARE	20	1	28
29			BUSSED SPACE								0.0						BUSSED SPACE			30
31			BUSSED SPACE						0.0								BUSSED SPACE			32
33			BUSSED SPACE							0.0							BUSSED SPACE			34
35			BUSSED SPACE								0.0						BUSSED SPACE			36
37			BUSSED SPACE						0.0								BUSSED SPACE			38
39			BUSSED SPACE							0.0							BUSSED SPACE			40
41			BUSSED SPACE								0.0						BUSSED SPACE			42
CONNECTED LOAD (KVA)				3.6	2.4	0.0	0.0	0.0	3.8	4.8	1.2	1.2	2.4	0.0	0.0	0.0				
25% OF LARGEST MOTOR (KVA)																				
TOTAL CONNECTED LOAD (KVA)				4.8	4.8	0.0	0.0	0.0												
DEMAND FACTOR				1.0	1.25	1.0	X	1.25									TOTAL DEMAND (KVA)	11		
TOTAL DEMAND LOAD (KVA)				4.8	6.0	0.0	0.0	0.0									LINE CURRENT (AMPS)	30		

X= 1ST 10KVA @ 100%, + REMAINDER @ 50% (N.E.C. 220-44) — HWH - HOT WATER HEATER

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NATIONAL HARBOR, MD 20745
301-203-1784

REVISIONS		
DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/29/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

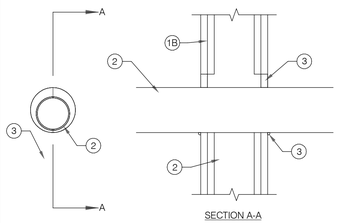
PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND — SUBHASH VISWANATHAN — No. 50803 — PROFESSIONAL ENGINEER
12/29/2023

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland. License No. 50803, Expiration Date 04/13/2025

SHEET TITLE
ELECTRICAL SCHEDULES

DRAWN BY NA — CHECKED BY SM — SHEET NO **E-601**
SET DESCRIPTION 100% CONSTRUCTION DOCUMENTS
DATE 12/29/2023



GYPSUM WALLBOARD

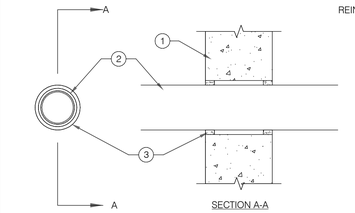
F RATINGS - 1 AND 2 HR
T RATING - 0 HR

L RATING AT AMBIENT - LESS THAN 1 CFM/SQ FT

L RATING AT 400 F - LESS THAN 1 CFM/SQ FT

SECTION A-A

1. WALL ASSEMBLY - THE FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:
   - 1.1. STUDS - WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. LUMBER SPACED 16 IN. OC. STEEL STUDS TO BE MIN 3-5/8 IN. WIDE AND SPACED MAX 24 IN. OC.
   - 1.2. GYPSUM BOARD* - THICKNESS, TYPE, NUMBER OF LAYERS AND FASTENERS AS REQUIRED IN THE INDIVIDUAL WALL AND PARTITION DESIGN. MAX DIAM OF OPENING IN WOOD STUD WALLS IS 8 IN. MAX DIAM OF OPENING IN STEEL STUD WALLS IS 14 IN. THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS EQUAL TO THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED.
2. THROUGH PENETRANT - ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED WITHIN THE FIRESTOP SYSTEM. THE SPACE BETWEEN PIPE, CONDUIT OR TUBING AND PERIPHERY OF OPENING SHALL BE A MIN 0 IN. (POINT CONTACT) TO A MAX 2 IN. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:
   - 2.1. STEEL PIPE - NOM 12 IN. DIAM (OR SMALLER) SCHEDULE 5 (OR HEAVIER STEEL PIPE.
   - 2.2. IRON PIPE - NOM 12 IN. DIAM (OR SMALLER) CAST OR DUCTILE IRON PIPE.
   - 2.3. CONDUIT - NOM 4 IN. DIAM (OR SMALLER) ELECTRICAL METALLIC TUBING, NOM 6 IN. DIAM (OR SMALLER) STEEL CONDUIT OR NOM 1 IN. DIAM (OR SMALLER) FLEXIBLE STEEL CONDUIT.
   - 2.4. COPPER TUBING - NOM 6 IN. DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
   - 2.5. COPPER PIPE - NOM 6 IN. DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
3. FILL, VOID OR CAVITY MATERIAL* - CAULK - MIN 5/8 IN. THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH BOTH SURFACES OF WALL. MIN 3/8 IN. DIAM BEAD OF FILL MATERIAL APPLIED AT POINT CONTACT LOCATION AT THE PENETRANT/GYPSUM BOARD INTERFACE ON BOTH SIDES OF WALL.
4. PENETRATIONS THROUGH STRUCTURE SHALL MAINTAIN FIRE RESISTANCE AND COMPLY WITH SECTION 714.3 OF IBC 2018. ALL ANNULAR SPACES BETWEEN RATED STRUCTURE/ENCLOSURE SHALL BE FILLED WITH APPROVED MATERIAL COMPLYING WITH REQUIREMENTS OF UL 1479.



REINFORCED CONCRETE

F RATING - 2 HR.
T RATING - 0 HR.

SECTION A-A

1. WALL ASSEMBLY - MIN 6 IN. (152 MM) THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF OR 1600-2400 KG/M3) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS*. MAX DIAM OF OPENING IS 25 IN. (635 MM). SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR THE NAMES OF MANUFACTURERS.
2. THROUGH PENETRANT - ONE METALLIC PIPE, TUBING OR CONDUIT TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. THE ANNULAR SPACE BETWEEN PIPES, TUBING OR CONDUITS AND PERIPHERY OF OPENING IS DEPENDENT UPON THE TYPE AND MAX DIAM OF THE THROUGH PENETRANT AS TABULATED BELOW. PIPE, TUBING OR CONDUIT TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, TUBING OR CONDUITS MAY BE USED:
   - 2.1. STEEL PIPE - NOM 24 IN. (610 MM) DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
   - 2.2. IRON PIPE - NOM 24 IN. (610 MM) DIAM (OR SMALLER) CAST OR DUCTILE IRON PIPE.
   - 2.3. COPPER TUBING - NOM 6 IN. (152 MM) DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
   - 2.4. COPPER PIPE - NOM 6 IN. (152 MM) DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
   - 2.5. CONDUIT - NOM 4 IN. (102 MM) DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING, NOM 6 IN. (152 MM) DIAM GALV STEEL CONDUIT OR NOM 1 IN. DIAM FLEXIBLE STEEL CONDUIT.

TYPE OF THROUGH PENETRANT	MAX DIAM OF THROUGH PENETRANT, IN. (MM)	MIN & MAX ANNULAR SPACE, IN. (MM)
STEEL OR IRON PIPE	4 (102)	0, 1-1/2 (38)
STEEL TUBING OR CONDUIT	4 (102)	0, 1-1/2 (38)
STEEL CONDUIT	6 (152)	1/8 (3), 1/2 (13)
STEEL OR IRON PIPE	24 (610)	1/8 (3), 1/2 (13)
COPPER TUBING OR PIPE	6 (152)	1/8 (3), 1/2 (13)

3. FILL, VOID OR CAVITY MATERIAL* - SEALANT - MIN 5/8 IN. (16 MM) THICKNESS OF FILL MATERIAL APPLIED WITHIN ANNULUS, FLUSH WITH BOTH SURFACES OF WALL. AT THE POINT CONTACT LOCATION BETWEEN THROUGH PENETRANT AND CONCRETE, A MIN 3/8 IN. (10 MM) DIAM BEAD OF FILL MATERIAL SHALL BE APPLIED AT THE CONCRETE/THROUGH PENETRANT INTERFACE ON BOTH SURFACES OF WALL.
4. PENETRATIONS THROUGH STRUCTURE SHALL MAINTAIN FIRE RESISTANCE AND COMPLY WITH SECTION 714.3 OF IBC 2018. ALL ANNULAR SPACES BETWEEN RATED STRUCTURE/ENCLOSURE SHALL BE FILLED WITH APPROVED MATERIAL COMPLYING WITH REQUIREMENTS OF UL 1479.

1 / E-701 THROUGH-PENETRATION FIRE STOP
NTS
0 6" 1' 2'

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REVISIONS		
DATE	NO.	ISSUED FOR
09/08/2023	1	60% CONSTRUCTION DOCUMENTS
10/27/2023	2	95% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND — SUMAN MOGERA — 50803 — PROFESSIONAL ENGINEER
12/29/2023

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland. License No. 50803, Expiration Date 04/13/2025

SHEET TITLE
ELECTRICAL DETAILS

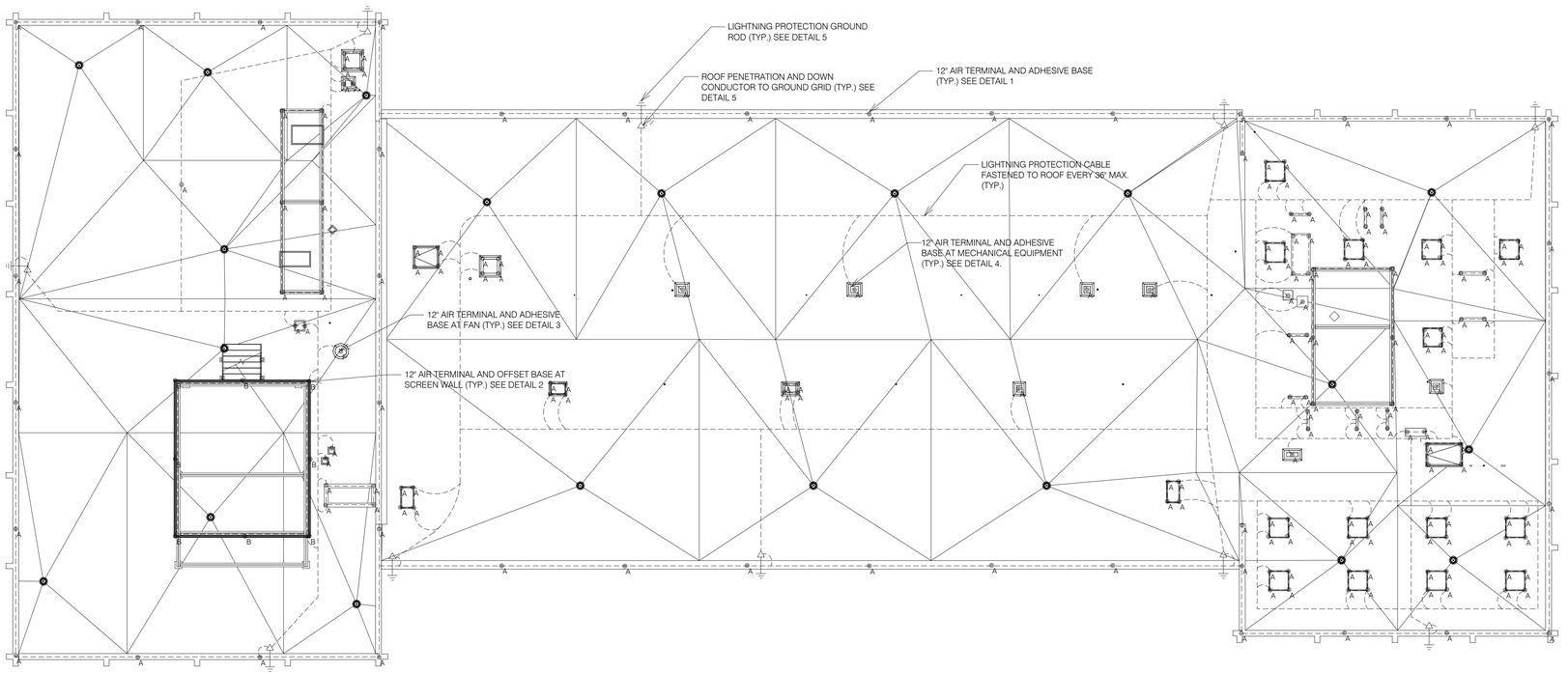
DRAWN BY	CHECKED BY	SHEET NO
Author	Checker	E-701

SET DESCRIPTION
100% CONSTRUCTION DOCUMENTS

DATE
12/29/2023

STAPLE EDGE

CONTRACTOR TO PROVIDE UL MASTER LABEL ON NEW LIGHTNING PROTECTION SYSTEM.



1 E-801 ELECTRICAL LIGHTNING PROTECTION PLAN
3/32" = 1'-0"
0 8' 16' 24'

KEY PLAN

MICHAEL GRAVES

31 LIGHT STREET
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PHONE: 410.290.9680
MICHAELGRAVES.COM

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301-203-1784

REVISIONS		
DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/29/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

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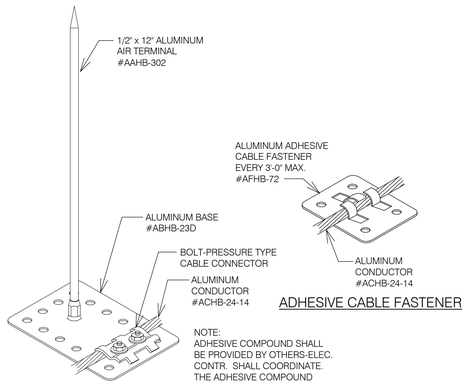
License No. 50803, Expiration Date 04/13/2025

SHEET TITLE
LIGHTNING PROTECTION PLAN

DRAWN BY	CHECKED BY	SHEET NO
NA	SM	E-801

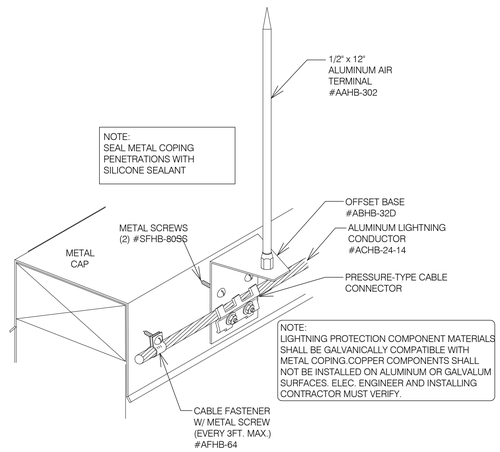
SET DESCRIPTION
100% CONSTRUCTION DOCUMENTS

DATE
12/29/2023

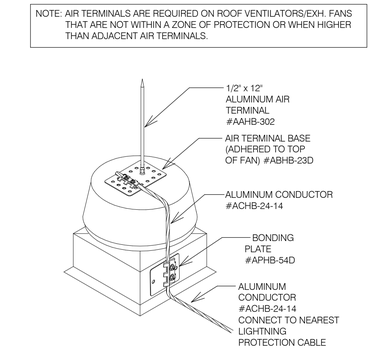


ADHESIVE CABLE FASTENER

1 AIR TERMINAL BASE
NTS SYMBOL $^{\#}_{A}$



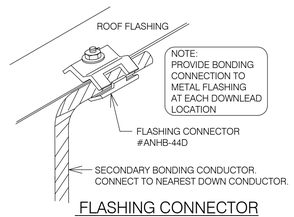
2 OFFSET AIR TERMINAL BASE
NTS SYMBOL $^{\#}_{B}$



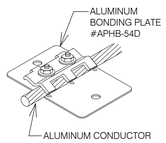
3 AIR TERMINAL AT EXH FAN
NTS SYMBOL $^{\#}_{F}$

BONDING LUG (GUTTERS)
NTS

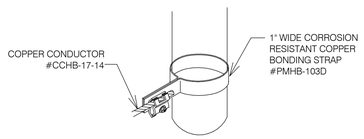
BONDING STRAP AT (VENT PIPES)
NTS



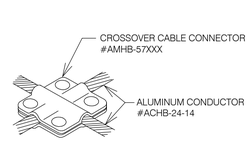
FLASHING CONNECTOR
NTS



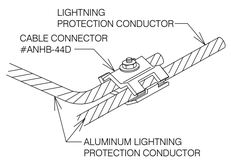
BONDING PLATE
NTS



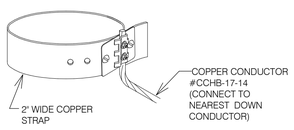
PIPE CLAMP (RAILINGS, ANTENNAS, ETC.)
NTS



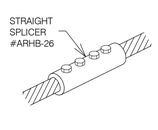
CROSSOVER CABLE CONNECTOR
NTS



CABLE CONNECTOR
NTS



WATERLINE BONDING STRAP
NTS



STRAIGHT SPLICER
NTS

LIGHTNING PROTECTION NOTES

1. ALL MATERIALS SHOWN ARE MANUFACTURED BY HEARY BROS. LIGHTNING PROTECTION CO., INC. OR APPROVED EQUAL.
2. THE LIGHTNING PROTECTION SYSTEM AS SHOWN ON DRAWING HAS BEEN DESIGNED IN ACCORDANCE WITH UL96 & NFPA-780 LIGHTNING PROTECTION SYSTEM STANDARDS.
3. CONDUCTORS SHALL MAINTAIN A HORIZONTAL OR DOWNWARD COURSE, FREE FROM "U" OR "V" (DOWN AND UP) POCKETS.
4. NO BEND OF CONDUCTOR SHALL FORM AN ANGLE OF LESS THAN 90° NOR SHALL HAVE A RADIUS OF BEND LESS THAN 8".
5. AIR TERMINALS SHALL BE SPACED EVERY 20'-0" MAXIMUM AROUND THE ROOF PERIMETER AND/OR ALONG ROOF RIDGES. AIR TERMINALS SHALL BE LOCATED WITHIN 2'-0" OF OUTSIDE CORNERS.
6. AIR TERMINALS SHALL BE SPACED EVERY 50'-0" MAXIMUM IN CENTER ROOF AREAS.
7. ACTUAL JOBSITE CONDITIONS MAY REQUIRE SLIGHT ALTERATIONS IN AIR TERMINAL, DOWN CONDUCTOR AND GROUND ROD LOCATIONS.
8. BARE COPPER MATERIALS SHALL NOT BE INSTALLED ON ALUMINUM OR GALVALUM SURFACES, AND ALUMINUM MATERIALS SHALL NOT BE INSTALLED ON COPPER SURFACES.
9. ALL LIGHTNING PROTECTION CONDUCTORS SHALL BE FASTENED EVERY 3'-0" MAX.
10. METALLIC BODIES OF INDUCTANCE SITUATED WITHIN 6'-0" OF A LIGHTNING CONDUCTOR OR ANOTHER BONDED METAL BODY SHALL BE INTERCONNECTED TO THE LIGHTNING CONDUCTOR SYSTEM, UNLESS INHERENTLY GROUNDED.
11. BOND TO ALL METAL BODIES OF CONDUCTANCE WITHIN 6'-0" OF THE MAIN LIGHTNING CONDUCTOR SUCH AS EXHAUST FANS, ROOF VENTS, METAL COOLING TOWERS, H.V.A.C. UNITS, LADDERS, RAILINGS, ANTENNAS, SKYLIGHTS, METAL STACKS AND ANY OTHERS LARGE METAL BODY WHOSE HEIGHT EXCEEDS THAT OF THE AIR TERMINAL IN USE, UNLESS PROTECTED BY HIGHER ROOF ELEVATIONS.
12. CONNECTIONS TO GROUND RODS SHALL BE MADE AT A POINT NOT LESS THAN 1'-0" BELOW FINISHED GRADE AND 2'-0" AWAY FROM FOUNDATION WALL.
13. BOND TO WATERLINES (DOMESTIC & FIRE).
14. A LIGHTNING ARRESTOR, PROTECTOR OR ANTENNA DISCHARGE UNIT SHALL BE INSTALLED ON EACH ELECTRIC AND TELEPHONE SERVICE AND RADIO AND TELEVISION ANTENNA LEAD-IN BY THE ELECTRICAL CONTRACTOR, IN ACCORDANCE WITH NFPA-70.
15. TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS) OF SERVICES SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR. (I.E. COMPUTERS, COPIERS, TELEPHONE, ETC.).
16. UPON COMPLETION OF INSTALLATION UL MASTER LABEL SHALL BE ISSUED.

MICHAEL GRAVES

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NATIONAL HARBOR, MD 20745
301-203-1784

REVISIONS		
DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/29/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND — SUSHMA VENUGOPAL NAGARAJ — No. 508003 — PROFESSIONAL ENGINEER — 12/29/2023

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland.
License No. 50803, Expiration Date 04/13/2025

SHEET TITLE
LIGHTNING PROTECTION DETAILS

DRAWN BY	CHECKED BY	SHEET NO
NA	SM	E-802

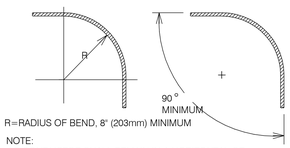
SET DESCRIPTION
100% CONSTRUCTION DOCUMENTS

DATE
12/29/2023

STAPLE EDGE

LIGHTNING PROTECTION MATERIALS LIST

	ALUMINUM LIGHTNING PROTECTION MAIN CONDUCTOR	ACHB-24-14
	ALUMINUM LIGHTNING PROTECTION SECONDARY BONDING CABLE*	ACHB-#4
	COPPER LIGHTNING PROTECTION DOWN CONDUCTOR	CCHB-17-14
	BIMETAL CONNECTOR	MNHB-93
	CABLE FASTENERS (FASTEN CABLE EVERY 3FT. MAX.)	AFHB-72, 64 CFHB-72, 64
A	1/2" x 12" ALUMINUM AIR TERMINAL AND ADHESIVE BASE	AAHB-302, ABHB-23D
B	1/2" x 12" ALUMINUM AIR TERMINAL AND OFFSET BASE (AT PARAPETS)	AAHB-302, ABHB-32D
F	1/2" x 12" ALUMINUM AIR TERMINAL AND ADHESIVE BASE (AT ROOF TOP EQUIPMENT)	AAHB-302, ABHB-23D
	SECONDARY BONDING: *FLASHING CONNECTOR *METAL ROOF DRAIN / GUTTER CONNECTOR *METAL VENT PIPE CONNECTOR	 ANHB-44D ANHB-160D ANHB-42XD
	ALUMINUM BONDING PLATE (AT ALUM. RTU & FANS)	APHB-54D
	CORROSION RESISTANT COPPER BONDING PLATE (TO BASE OF STEEL AT EACH DOWNLEAD)	PPHB-54D
	PIPE CLAMP (ANTENNAS, RAILINGS, ETC.)	PMHB-103D
	"C" CLAMP (LADDERS)	PPHB-54D
	CABLE CONNECTOR	ANHB-44D, CNHB-44D
	STRAIGHT SPLICER	ARHB-26
	CROSSOVER CABLE CONNECTOR	CMHB-57XXX
	WATERLINE CONNECTOR (FIRE WATER & DOMESTIC WATER)	CMHB-97D
	5/8" x 10'-0" COPPERWELD GROUND ROD AND CONNECTOR	CGHB-106GR, CGHB-57D

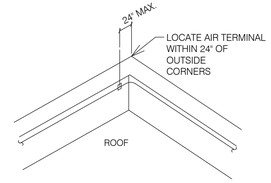


R=RADIUS OF BEND, 8" (203mm) MINIMUM

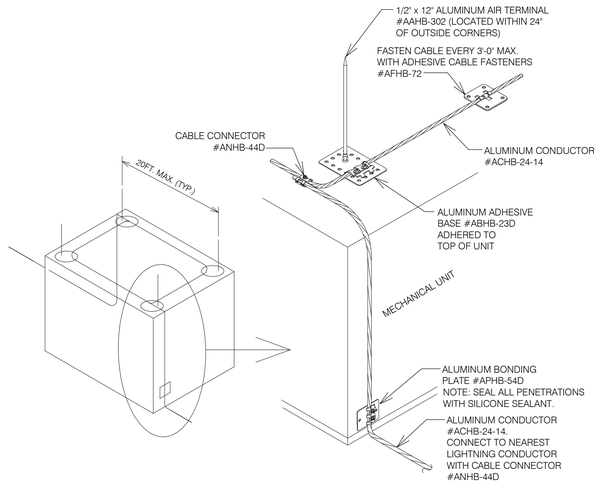
NOTE:
-LP CONDUCTOR SHALL REMAIN IN A HORIZONTAL OR DOWN- WARD PATH AVOIDING "U" & "V" POCKETS (DOWN & UP).

-NO BEND OF A CONDUCTOR SHALL FORM AN INCLUDED ANGLE OF LESS THAN 90° OR HAVE A RADIUS OF BEND LESS THAN 8".

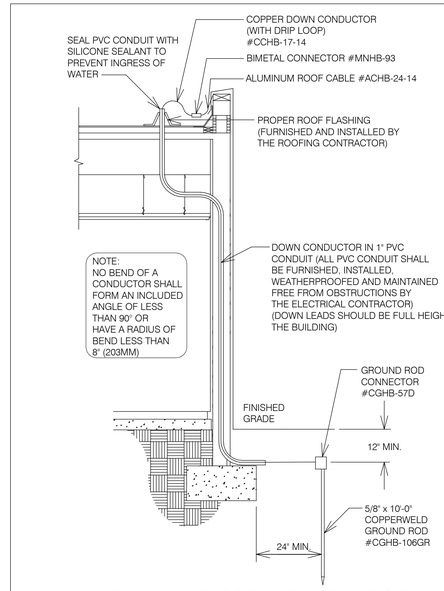
8" MIN. RADIUS BEND IN CABLE



AIR TERMINALS SHALL BE LOCATED WITHIN 24" OF OUTSIDE CORNERS
NTS

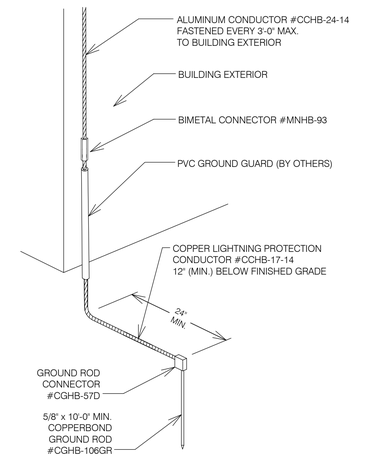


4 LIGHTNING PROTECTION AT ROOF TOP UNIT
NTS SYMBOL A



5 LIGHTNING PROTECTION GROUNDING
NTS SYMBOL

OR



6 EXPOSED LIGHTNING PROTECTION DOWN CONDUCTOR AND GROUNDING
NTS SYMBOL

MICHAEL GRAVES

6325 WOODSIDE COURT
SUITE 310
COLUMBIA, MD 21046
PHONE: 410.290.9680
MICHAELGRAVES.COM

PRINCETON
NEW YORK
WASHINGTON D.C.
BALTIMORE
COLUMBIA

OWNER / CLIENT
BALTIMORE CITY PUBLIC SCHOOLS
202 EAST NORTH AVENUE
BALTIMORE, MD. 21202

MEP ENGINEER
SETTY & ASSOCIATES INT. PLLC.
575 S. CHARLES STREET, STE 403
BALTIMORE, MD 21201
(667) 309 6036

STRUCTURAL ENGINEER
LEUTERIO THOMAS, LLC
6710 OXON HILL RD., SUITE 300
NATIONAL HARBOR, MD 20745
301-203-1784

REVISIONS

DATE	NO.	ISSUED FOR
10/27/2023	2	95% CONSTRUCTION DOCUMENTS
12/29/2023	3	100% CONSTRUCTION DOCUMENTS

PROJECT NAME
Roof Replacement at Mt. Washington School #221

PSC#: 30.268.21/23

PROJECT ADDRESS
1801 Sulgrave Avenue, Baltimore, MD 21209

PROJECT NUMBER WMD-23034-00

STATE OF MARYLAND · SUSHMA MOHAN NAGARAJ · 50803 · PROFESSIONAL ENGINEER · 12/29/2023

PROFESSIONAL CERTIFICATION
I hereby certify that these documents were PREPARED or APPROVED by me, and that I am a duly licensed professional Engineer under the laws of the state of Maryland.
License No. 50803, Expiration Date 04/13/2025

SHEET TITLE
LIGHTNING PROTECTION DETAILS

DRAWN BY NA | CHECKED BY SM
SET DESCRIPTION 100% CONSTRUCTION DOCUMENTS
DATE 12/29/2023
SHEET NO E-803

AMENDMENT #5

December 1, 1993
(For the period ending June 30, 1993

AHERA

ASBESTOS CONTAINING MATERIALS MANAGEMENT PLAN

dated May 9, 1989

School No. PS221

School Name Mt Washington Elementary

NOTICE

NO Asbestos Response Actions for school for period reported under this amendment attached.

Issued By
BALTIMORE CITY PUBLIC SCHOOLS

Asbestos Coordinator
Designated Local Education Agency Representative

PLEASE POST PLEASE POST

City of Baltimore Public Schools

ASBESTOS PROGRAM

NOTICE TO SCHOOL BUILDING VISITORS AND OCCUPANTS (TEACHERS, STUDENTS, OPERATING ENGINEERS AND CUSTODIAL PERSONS) OF **ASBESTOS MANAGEMENT PLAN AMENDMENT NO. 5** AND AVAILABILITY OF **ASBESTOS MANAGEMENT PLAN** FOR INSPECTION.

An amendment to the **Asbestos Management Plan** has been appended to the management plans for asbestos to be kept in the building administrative office. This is Amendment #5 and is **dated December 1, 1993**. This amendment is available for inspection by making request to the building principal.

EPA Rules for school buildings require:

(1) We maintain records on asbestos in each school.

(2) Inform our building occupants and visitors on asbestos in each school building of locations of and response actions for asbestos in each school.

(3) Give right-of-way to EPA and State of Maryland environmental inspectors.

Failure to fulfill the above may result in serious civil and possible criminal penalties assessed against the City for failure to perform the above including possible criminal penalties against persons who willfully avoid the EPA Rules.

If the **Asbestos Management Plan and the Amendments** to it are not available in your school from the principal report it to **Environmental Services - Asbestos Office at 396-7832** immediately.,

David W. Mitchell
Baltimore City Asbestos Coordinator
and Designated LEA Representative

City of Baltimore Public Schools

AMENDMENT #5

December 1, 1993

INTRODUCTION

These amendments are issued annually to update the **Asbestos Management Plan** for each building under control of Baltimore City Public Schools.

Contents of each annual amendment will include:

- Asbestos response actions for the building (if any);
- **Table IA** containing the remaining quantities of asbestos containing material in the building;
- A copy of the surveillance logs for the building done at a minimum of a semi-annual basis;
- any other pertinent information.

An asbestos response action shall include any work to clean up asbestos in response to a major or minor fiber release episode, or any work action to remove, encapsulate, enclose, or repair asbestos containing materials.

Persons reading this amendment are encouraged to read the **Asbestos Management Plan** to thoroughly understand the location and extent of asbestos containing materials in the building.

David W. Mitchell
Baltimore City Asbestos Coordinator
and Designated LEA Representative

VERIFICATION OF ASBESTOS DATA: AMENDMENTS #1, 2, 3 & 4 AND 1 COPY OF ASBESTOS MANAGEMENT PLANS, DATED SEPTEMBER 20, 1989, LOCATED IN THE MAIN OFFICE OF ALL BALTIMORE CITY PUBLIC SCHOOLS.

SCHOOL NO.: 221

SCHOOL NAME: Mount Washington Elementary

SCHOOL ADDRESS: 1801 Sylgrove Ave
Baltimore, Md 21209

MANAGEMENT PLANS ARE AT SCHOOL? YES ✓ NO _____

ARE AMENDMENTS #1, 2, 3 & 4 AT SCHOOL? YES ✓ NO #2

IF ANY ARE MISSING, PLEASE SPECIFY. #2 Amendent

DELIVERED/VERIFIED BY: Robert West
(Inspector) (Print Name)

Robert West
(Signature)

DATE: Sept. 27, 1993 TIME: 10:45 Am

RECEIVED/VERIFIED BY: Jacqueline E. Waters-Scofield
(School Personnel) (Print Name)

Jacqueline E. Waters-Scofield
(Signature)

DATE: September 27, 1993 TIME: 10:53a.m.

Please return to:

Environmental Services
2011 Linden Avenue, Portable Bldg. #61
Baltimore, Md. 21217

1993 FISCAL YEAR

ASBESTOS MANAGEMENT PROGRAM

FIELD INSPECTION LOG OF QUARTERLY SURVEILLANCE

FOR SCHOOL P.S. #221

1st QUARTER INSPECTION

Performed by Roland M. Diggs

Date Performed _____

2nd QUARTER INSPECTION

Performed by Robert West

Date Performed 9/27/93

3rd QUARTER INSPECTION

Performed by Robert West

Date Performed 9/27/93

4th QUARTER INSPECTION

Performed by Robert West

Date Performed _____

SEE ATTACHED SURVEILLANCE REPORT FORMS FOR FINDINGS

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
01- Boiler Room	Boiler breeching block and trowelled-on insulation		✓		✓		✓		✓	
	Hot water generator block and trowelled-on insulation		✓		✓		✓		✓	
	Heating system preformed pipe insulation		✓		✓		✓		✓	
	Heating system fitting and valve trowelled-on insulation		✓		✓		✓		✓	
	Domestic water fitting and valve trowelled-on insulation		✓		✓		✓		✓	
	Fire door		✓		✓		✓		✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
02- Crawl Space	Heating system preformed pipe insulation		✓	✓		✓		✓		Removed 1992 Fiber
	Heating system fitting trowelled-on insulation		✓	✓		✓		✓		
	Domestic water fitting trowelled-on insulation		✓	✓		✓		✓		
03- Above Suspended Ceilings and in Pipe Chases	Heating system preformed pipe insulation		✓	✓	✓		✓		✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
06- Hallways and Stairwells	Heating system preformed pipe insulation		✓		✓		✓		✓	
	Heating system fitting trowelled-on insulation		✓		✓		✓		✓	
	Vinyl asbestos tile		✓		✓		✓		✓	
07- Storage Areas	Heating system preformed pipe insulation		✓		✓		✓		✓	
	Heating system fitting trowelled-on insulation		✓		✓		✓		✓	
	Domestic water fitting trowelled-on insulation		✓		✓		✓		✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Heating system fitting trowelled-on insulation		✓		✓		✓		✓	
	Domestic water fitting trowelled-on insulation		✓		✓		✓		✓	
04- Cafeteria	Vinyl asbestos tile		✓		✓		✓		✓	
	Fire doors (2)		✓		✓		✓		✓	
05- Incinerator Room	Domestic water fitting trowelled-on insulation		✓		✓		✓		✓	
	Fire door		✓		✓		✓		✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
08- Classrooms	Heating system preformed pipe insulation		✓		✓		✓		✓	
	Heating system fitting trowelled-on insulation		✓		✓		✓		✓	
	Vinyl asbestos tile		✓		✓		✓		✓	
09- Multi-Purpose Room and Stage	Heating system preformed pipe insulation		✓		✓		✓		✓	
	Heating system fitting trowelled-on insulation		✓		✓		✓		✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation		✓		✓		✓		✓	
	Vinyl asbestos tile		✓		✓		✓		✓	
	Fire doors (2)		✓		✓		✓		✓	
10- Toilets	Heating system preformed pipe insulation		✓		✓		✓		✓	
	Heating system fitting trowelled-on insulation		✓		✓		✓		✓	
	Domestic water fitting trowelled-on insulation		✓		✓		✓		✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation		✓		✓		✓		✓	
11- Janitor's Closet	Domestic water fitting trowelled-on insulation		✓		✓		✓		✓	
12- Offices, Health Suite, and Lounge	Heating system preformed pipe insulation		✓		✓		✓		✓	
	Heating system fitting trowelled-on insulation		✓		✓		✓		✓	
	Domestic water fitting trowelled-on insulation		✓		✓		✓		✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Vinyl asbestos tile		✓		✓		✓		✓	
13- Library	Vinyl asbestos tile		✓		✓		✓		✓	

AMENDMENT #5
December 1, 1993

TABLE 1-A

Baltimore City Schools

ACM in Schools and Removal During the Peroid
FISCAL 1993

	CEILING & WALLS					FLOOR COVER	MECHANICAL						OTHER			MISCELLANEOUS			
Job No	Spray On SF	Tile SF	Acoustic Plaster SF	Other Plaster SF	Wallboard SF	VAT SF	Pipe LF	Elbows Fittings SF	Boilers Breeching SF	Tanks SF	Ductwork SF	Other TSI LF	Curtains SF	Firedoors Ea/SF	Cement Board SF	Soil SF	Wire LF	Misc LF	Misc SF
PS221																			
Beg Year						3000	2530	1410	400	100				126					
Year End						3000	2530	1410	400	100				126					

NOTES:
For locations of ACBM applications, see the AHERA Inspection Report and Management Plan for this building located in Section (1.2) and Appendix H.

For Job Detail, see Md. Dept. of Environment Job Notification, Asbestos Office job notification summary for this building, or invoices related to specific jobs.

ATTENTION!!!

PLEASE ATTACH THIS INFORMATION TO

AMENDMENT #4 OF THE

AHERA MANAGEMENT PLAN

(FOR THE PERIOD ENDING JUNE 30, 1992)

SCHOOL # 221

BALTIMORE CITY PUBLIC SCHOOLS

ASBESTOS COORDINATOR

DESIGNATED LOCAL EDUCATION AGENCY REPRESENTATIVE

MARCOR ENVIRONMENTAL, INC.

FIELD EMPLOYEES TRAINED FROM JULY 1, 1991 - JULY 1, 1992

NAME	STATE TRAINED	EXP. DATE	CERT. NUMBER	TITLE	HOURS TRAINED
ABERNETHY,SHANE	MD	06/12/92	312	W	24
ALBEA,NATHANIEL	MD	06/13/92	935	W	24
ANDERSON,FRED	MD	09/24/92	1679	W	24
ANDERSON,JOSE	MD	03/24/93	2020	S	32
AYALA,JESUS	MD	11/13/92	9111157	W	24
BALONIS,ROBIN	MD	01/21/93	113	S	32
BAUBLITZ,HARRY	MD	06/25/93	2465	W	24
BECK,EDWARD	MD	09/23/93	2976	S	32
BENNETT,RICHARD	MD	05/21/92	837	S	32
BLAKE,MICHAEL	MD	01/24/92	77	W	24
BOONE,LOUIS	MD	12/13/91	1973	W	24
BOULAYPHANH,KAYONH	MD	06/04/93	2350	W	24
BOUAPHAANH,KHAMKENG	MD	07/30/92	1263	W	24
BOUNSYNHAVONG,NOPHON	MD	06/25/93	2466	W	24
BOUTJAREUN,SOMPHONE	MD	06/04/93	2317	W	24
BOWMAN,CHARLES	MD	01/09/93	18	W	24
BOYKINS,AVON	MD	09/05/92	1560	W	24
BROCK,CHARLES	MD	01/09/93	23	W	24
BURBANK,ROBERT	MD	08/07/93	2763	W	24
CABRERA,ESVIN	MD	01/18/93	MISTS921020	W	24
CARR,ARTHUR	MD	01/09/93	31	W	24
CHANTHAVONG,BOUNMA	MD	06/25/93	2461	W	24
CHANTIVISACK,SISAVEUY	MD	05/01/93	2163	W	24
CHOI	MD	01/21/93	94	W	24
COFFEEY,CHERI	MD	07/29/93	2726	W	24
COLLINS,OLIVER	MD	06/25/93	2462	W	24
COOPER,GENE	MD	06/25/92	1208	W	24
COTTER,MARK	MD	07/15/93	2588	W	24
CRUZ,RENZO	MD	11/05/93	3170	S	32
CULEBRO,JOSE	MD	05/20/93	2255	W	24
DAVIS,BRUCE	MD	06/29/93	2490	W	24
DODSON,KEVIN	MD	08/01/93	MDIC-91-0047	W	24
DOYLE,JOHN	MD	08/08/92	1338	W	24
DUBOSE,RODNEY	MD	08/22/92	1517	W	24
DUNLAP,JOSEPH	MD	08/06/92	1316	W	24
EICHMAN,GERALD	MD	01/09/93	25	W	24
EIKENBERG,RICHARD	MD	05/04/93	2189	S	32
ELLICK,BRIAN	MD	07/23/93	2653	W	24
EPOUSE-KAMARA,ALUSINE	MD	07/15/93	2595	W	24
ESTADA,PEDRO	MD	08/27/93	2833	W	24
FARR,WALTE	MD	05/28/93	2284	W	24
FLEMING,RONALD	MD	05/07/93	2193	W	24
FLINTALL,DWAYNE	MD	09/08/93	2893	W	24
FOLKENROTH,KEVIN	MD	07/29/93	2688	S	32

MARCOR ENVIRONMENTAL, INC.

FIELD EMPLOYEES TRAINED FROM JULY 1, 1991 - JULY 1, 1992

NAME	STATE TRAINED	EXP. DATE	CERT. NUMBER	TITLE	HOURS TRAINED
FOXWORTH,ERIC	MD	05/20/92	2273	W	24
FRANKLIN,ROBERT	MD	05/08/93	91050801	W	24
GALICIA,OSCAR	MD	01/08/93	MISTS921002	W	24
GAMARRO,BOSBELI	MD	08/05/92	91080521	W	24
GAMARRO,JULIO	MD	01/18/93	MISTS921019	W	24
GILL,ROBERT	MD	09/24/92	1696	S	32
GOODE,HARRY	MD	06/29/93	2484	W	24
GREGOREK,GARY	MD	09/19/92	1626	W	24
GUYTON,WILLIE	MD	01/09/93	17	W	24
HAMMERBACHER,NELSON	MD	12/05/92	2025	W	24
HANELUXAY,NOUNE	MD	09/08/93	2892	W	24
HANVICHID,BILL	MD	11/12/92	1951	W	24
HARNYUENGYONG,PRAKIT	MD	07/14/93	2581	W	24
HARVEY,RONALD	MD	02/25/93	1935	S	32
HASELBACK,JIM	MD	01/09/93	33	W	24
HENRY,DARREN	MD	09/15/92	1558	W	24
HERNANDEZ,JOSE	MD	08/04/93	2704	W	24
HERRERA,ESVIN	MD	10/26/92	MISTS911508	W	24
HERRERA,SERGIO	MD	06/14/93	5063	W	24
HEWLETT,TROY	MD	10/21/91	N/A	W	24
HILTON,DAVID	MD	05/14/93	2062	S	32
HNOANG,DUY	MD	06/03/93	1154	W	24
HOMSOMBATH,BOUNTHAVY	MD	06/18/92	980	W	24
HOMSOMBATH,VILAY	MD	06/18/92	978	W	24
HOPKINS,MICHAEL	MD	05/20/93	92052195	W	24
HOWELL,KENNTH	MD	11/05/93	3171	W	24
HUTCHINS,EVERETT	MD	08/02/91	1965	W	24
HUYNH,HOANG	MD	06/11/93	2375	W	24
INTHAVONG,CHAN	MD	06/25/93	2460	W	24
INTHAVONG,SINGKHAM	MD	01/21/93	79	W	24
JINADU,FEMI	MD	07/14/93	2585	W	24
JOHNSON,WILLIAM	MD	09/22/93	2948	W	24
JONES,MARK	MD	05/28/93	2295	W	24
JONES,RICKIE	MD	06/05/93	2354	S	32
JONES,WILLIAM	MD	06/27/92	1018	W	24
JUDADO,EDGAR	MD	11/15/92	91111505	W	24
KEOMANY,KHAMLA	MD	06/20/93	959	W	24
KHANTRY,KHAMLA	MD	01/28/93	131	W	24
KHOMPHENCHANH,LINTHON	MD	01/21/93	115	W	24
KIMBROUGH,JESSE	MD	12/03/91	1950	W	24
KLOCK,ALAN	MD	07/16/92	1178	W	24
KNECHT,FRANK	MD	09/09/93	2898	S	32
KRIETE,KEVIN	MD	09/17/92	1627	W	24
KRIVOSH,RICHARD	MD	03/13/93	1968	W	24

MARCOR ENVIRONMENTAL, INC.

FIELD EMPLOYEES TRAINED FROM JULY 1, 1991 - JULY 1, 1992

NAME	STATE TRAINED	EXP. DATE	CERT. NUMBER	TITLE	HOURS TRAINED
KUTZ,ALBERT	MD	05/20/93	1110	W	24
LANG,ROBERT	MD	05/24/92	853	W	24
LATHAM,RALPH	MD	06/03/93	1159	W	24
LAZO,MARTIN	MD	01/10/93	92011003	W	24
LEAZER,WILLIAM	MD	06/29/93	2491	W	24
LEE,PAUL	MD	09/19/92	1647	W	24
LEWIS,ARTIS	MD	09/05/92	1564	W	24
LINTON,THOMAS	MD	04/26/92	MISTS911312	W	24
LOMBARDI,MICHAEL	MD	06/04/92	911	W	24
LOZZI,CHRISTOPHER	MD	06/20/92	956	W	24
LUCAS,LOUIS	MD	05/07/92	736	S	32
LYONS,MARK	MD	08/22/92	1464	W	24
MAEKSOMPORN,SINGHAM	MD	07/30/92	2736	S	32
MALLORY,ARTHUR	MD	09/19/92	1633	W	24
MANIPHONE,BILLY	MD	07/29/93	2693	W	24
McBRIDE,JIMMIE	MD	05/02/92	140001	W	24
McCARGISH,JACK	MD	05/04/93	2174	S	32
McKENZIE,MILTON	MD	09/20/92	1648	W	24
McLAMB,COREY	MD	05/07/93	2198	W	24
MEKSOMPHONE,KEN	MD	07/14/93	2585	W	24
MEKSOMPHONE,KEN S.	MD	08/11/93	2718	S	32
MEKSOMPHONE,OWEN	MD	06/12/93	2372	S	32
MEKSOMPHONE,TOM	MD	08/28/93	2852	S	32
MENDEZ,GONZALO	MD	08/15/93	2087	W	24
MERRITT,EDWIN	MD	02/25/93	1939	S	32
MERSON,JEFFREY	MD	05/20/93	92012196	S	32
MESSLER,JOHN	MD	09/08/93	2887	W	24
MORRIS,KEITH	MD	08/27/92	2832	W	24
MOTE,MICHAEL	MD	07/30/93	2741	S	32
MUMMA,RICHARD	MD	07/13/92	MISTS911344	W	24
NANCE,EDDIE	MD	09/05/92	1563	W	24
NELSON,MICHAEL	MD	07/30/93	2747	S	32
NGUYEN,DANG	MD	06/03/93	92060414	W	24
NGUYEN,MINH	MD	06/03/93	1155	W	24
NGUYEN,THANH	MD	06/11/93	2376	W	24
NORWOOD,TIMOTHY	MD	07/22/92	259	W	24
NOUANELADY,PHOUKHONG	MD	11/04/93	3164	W	24
NWAGBARAOCHA,OBEDIAH	MD	10/09/91	2508	W	24
OLSON,WAYNE	MD	06/04/93	2347	W	24
OWENS,ALBERT	MD	09/05/92	1559	W	24
PAMPLIN,CHARLES	MD	05/01/93	2158	S	32
PARKS,GARDNER	MD	07/15/93	2590	S	32
PATHOUMTHONG,SOMPHON	MD	07/16/92	1159	W	24
PATRICK,JOHN	MD	06/11/92	1110	W	24

MARCOR ENVIRONMENTAL, INC.

FIELD EMPLOYEES TRAINED FROM JULY 1, 1991 - JULY 1, 1992

NAME	STATE TRAINED	EXP. DATE	CERT. NUMBER	TITLE	HOURS TRAINED
PHANOUVONG,SISOUPHANH	MD	09/08/93	2891	W	24
PHANOUVONG,SOUVANH	MD	02/24/93	1915	W	24
PHAVIVONG,SOMBOUN	MD	07/14/93	2582	W	24
PHENSOMPHONE,BOUTHIEM	MD	04/09/92	536	W	24
PHIMPHANH,AMPHONE	MD	06/26/93	2464	S	32
PHIMPHANH,CHA	MD	01/23/93	99	W	24
PHIMPHANH,SOMSOUK	MD	04/14/93	2074	S	32
PHIMPHISANE,VIENGKHAM	MD	01/21/93	78	W	24
PHOUTTHACHONE,PAUL	MD	12/13/91	2766	W	24
PION,LAWRENCE	MD	01/21/93	118	S	32
RAGLAND,MICHAEL	MD	01/09/93	32	W	24
RAINEY,CHARLES	MD	07/14/93	2580	S	32
RAINEY,QUANE	MD	07/16/92	1151	W	24
RICHARDSON,JOSEPH	MD	01/09/93	24	W	24
SAENGPET,SOPHON	MD	01/03/92	2831	W	24
SCHROEDER,KENNETH	MD	02/26/92	314	W	24
SCOTT,FREDERICK	MD	07/15/93	2586	S	32
SENGCHANH,JIMMIE	MD	01/21/93	116	W	24
SENGCHANH, SAM	MD	11/04/92	3163	W	24
SHOCKEY, WILLIAM	MD	08/21/92	1479	S	32
SIMMONS, JOHN	MD	9/19/92	1634	W	24
SINGPARU, PIRUCH	MD	05/05/92	731	W	24
SINPRASEUTH, LAY	MD	06/18/92	981	S	32
SIRITHONGDY, KHAMCHANH	MD	06/04/93	2316	W	24
SOGUNRO, ABAYOMI	MD	02/25/93	1931	S	32
SOMBOUN, SCOTT	MD	02/05/93	92-02-05-05	S	32
SONG, YANG	MD	07/16/92	1157	W	24
SOTO, JURADO	MD	11/15/92	91-11-15-02	W	24
SOUKKAOHANH, BOUNTHAV	MD	11/15/93	3174	W	24
SOUTHALA, SITTHIPHANH	MD	06/04/93	2315	W	24
SOURINHADETH, SONE	MD	06/29/93	2684	W	24
SOUVANNAVONG, BOUN-HE	MD	01/28/93	190	W	24
SREEVIENGCHANH, VONE	MD	04/14/93	2069	W	24
STANLEY, TROY	MD	06/04/92	902	W	24
STEIN, MARK	MD	02/25/93	1940	S	32
STREET, DENNIS	MD	02/25/93	1934	S	32
SUMMERS, ROLAND	MD	06/29/93	2485	W	24
SWEENEY, DAVID	MD	09/22/93	2941	S	32
TATE, GORDON	MD	10/21/91	N/A	W	24
THANAVONG, KHAM	MD	01/03/93	10	W	24
THAMAVONG, SOMANH	MD	01/03/93	9	W	24
THEPSOUVANH, BOUALAY	MD	07/29/93	2692	W	24
THEPSOUVANH, SOMBOUN	MD	07/29/93	2691	W	24
THOCK, LUN	MD	08/10/93	2711	W	24

MARCOR ENVIRONMENTAL, INC.

FIELD EMPLOYEES TRAINED FROM JULY 1, 1991 - JULY 1, 1992

NAME	STATE TRAINED	EXP. DATE	CERT. NUMBER	TITLE	HOURS TRAINED
THONGDYGNALAT,CHANPH	MD	01/28/93	92	W	24
TORRES, CARLOS	MD	08/01/93	5175	W	24
TRAN, HUNG	MD	06/03/93	1153	W	24
TYLER, ALEXANDER	MD	09/05/92	1555	W	24
TYSON, WILLIAM	MD	07/16/92	1169	W	24
UZZLE, GEORGE	MD	08/14/91	2081	W	24
VASQUEZ, JOSE	MD	10/05/93	3020	W	24
VASQUEZ, NAPOLEON	MD	01/10/93	92-01-10-04	W	24
VEGA, JUAN	MD	06/04/93	2349	W	24
VINES, JAMES	MD	06/04/93	2321	W	24
VONGPHAKDY, SYSALEUMS	MD	07/30/93	2743	S	32
VONGSALY, VANKHAM	MD	03/26/92	481	W	24
WALLACE, DAVID	MD	07/29/93	2687	W	24
WALRATH, WILLIAM	MD	11/12/92	1957	S	32
WASHINGTON, JAMES	MD	09/08/93	2881	W	24
WASHINGTON, ZACHARY	MD	02/24/93	1917	W	24
WHITE, JESSE	MD	01/03/93	12	W	24
WILLIAMS, BAREASTER	MD	01/21/93	87	W	24
WILLIAMS, LARRY	MD	03/12/92	418	S	32
WILLIAMS, RICHARD	MD	06/20/92	180-50-3925	W	24
WILSON, DONALD	MD	11/04/93	3166	W	24
WITHERSPOON, NATHANIEL	MD	07/29/93	2727	W	24
WOLFE, DONALD	MD	07/02/92	190-56-6855	W	24
YOUNG, SCOTT	MD	09/05/92	1552	W	24
ZAMBELLI, FRANK	MD	02/28/93	1936	S	24

I H SERVICES, INC.

Industrial Hygiene and Related Services
Baltimore, Maryland 21224

1831 Portal Street
Suite E

Main Office
410-633-4000
FAX
410-633-4122

EXECUTIVE REPORT

Report Number: 3-509

Project: Mt. Washington Elementary School #221
1801 Sulgrave Avenue
Baltimore, MD 21209

Report To: Marcor Environmental
6679 Santa Barbara Road, Suite G
Baltimore, Maryland 21227

Table of Contents

Submitted by: Michael T. Darpino
Industrial Hygienist

Date Submitted: December 31, 1993

I EXECUTIVE SUMMARY

This executive report encompasses methodology, documentation, results and conclusions concerning all industrial hygiene work and services supplied by IH Services, Inc. This Report documents the work completed as follows:

Project: Mt. Washington Elementary School #221

Date: December 29 -30, 1993

IH Services Report No.: 3-509

The methodology in Section II of this Report defines the sampling protocol. Daily air monitoring data sheets, daily asbestos check lists, observation sheets and all accompanying figures used to detail sampling pump locations are in the documentation Section III. Analytical results are found in Section IV. References are found in Section V.

II METHODOLOGY

For all school buildings, and other buildings as requested, the AHERA (Asbestos Hazard Emergency Response Act of 1986) regulations are followed (40 CFR Part 763, Federal Register, Vol. 52, No. 210, Friday, October 30, 1987). The method used for any transmission electron microscopy analysis follows the protocol outlined in this document.

The sample protocol for optical (phase contrast) microscopy is the NIOSH Method 7400, Revision 3: 5/15/89 (NIOSH Manual of Analytical Methods, 5/15/89). NIOSH 7400 requires the use of a 3 piece, 25 mm cassette with a 50 mm extension cowl holding an 0.8 to 1.2 micrometer porosity, mixed cullulose ester filter membrane. Conductive cowls are used to limit problems with static electricity. All flow rates, volumes, positioning of pumps and cassettes, cassette filter media, pump calibration, number of samples, running of ventilation units, limits of detection and analytical methods and techniques for air monitoring are as per the city-wide Asbestos Abatement Requirement Contract BP-27087.

The polarized light microscopy method used for the determination of asbestos in bulk samples is the EPA Interim Bulk Method 600/M4-82-020.

Additional references employed include the "Purple Book" issued by the USEPA detailing guidelines for controlling asbestos-containing materials in buildings (EPA 560/5-85-024, "Guidance for Controlling Asbestos-Containing Materials in Buildings"), and the EPA document entitled "Measuring Airborne Asbestos Following an Abatement Action" (The "Silver Book").

III DOCUMENTATION

This section contains the daily paperwork arranged chronologically to include:

* General daily observation sheets reporting job progress,
* Daily asbestos abatement check lists,
* Air monitoring data sheets,
* Work area and sample location schematics
* Pre-abatement check lists (when applicable), and
* Final-abatement check lists (when applicable).

IH Services, Inc., meets the applicable requirements of 40 CFR Part 763 Section 763.90 (i) (2) (ii). The American Industrial Hygiene Association Proficiency Analytical Testing Laboratory number is 21224-002.

All other laboratories used by IH Services, Inc., for the analysis of samples also meet the applicable requirements of 40 CFR Part 763 Section 763.90 (i) (2) (ii).

I H SERVICES, INC.

1831-E Portal Street • Baltimore, Maryland 21224

PHONE: (410) 633-4000

FAX: (410) 633-4122

DAILY OBSERVATIONS

DATE: 12-29-93

INSPECTOR: Michael Pompeo

SITE: Mt Washington Elem

TITLE: I.H. Tech.

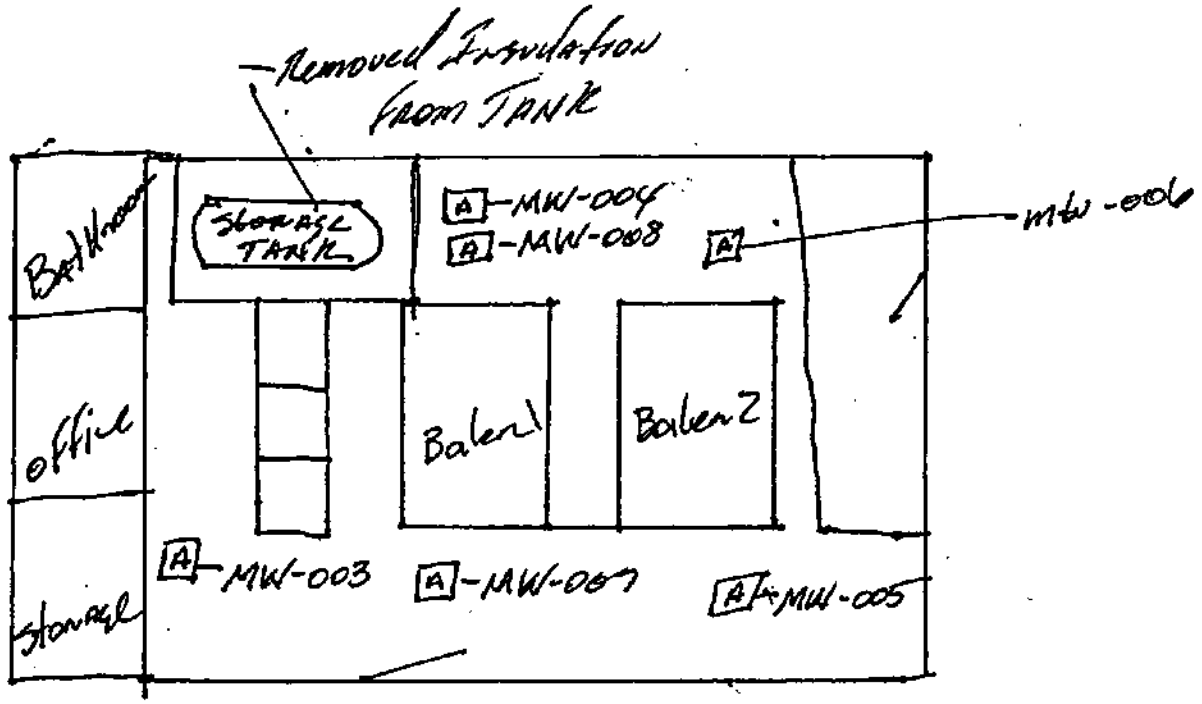
PURPOSE OF VISIT: Monitor the Removal of ACM Insulation from a water storage tank in the boiler Room.

GENERAL OBSERVATIONS: Arrived on site men loaded materials into the boiler Room and started setting up a full containment around the water storage tank behind boiler #1 started Pre Samples + then Area Ambient samples the rest of the day. Before leaving the men were completely setup + ready for Removal. I will inspect the Area @ when I Arrive 12-30-93.

DATE: 12-29-93

GENERAL OBSERVATIONS CONTINUED:

Mt. Washington Elementary
Boiler Rm.



(B) Blank MW-001

(B) Blank MW-002

AI AREA

I H SERVICES, INC.

1831 Portal Street - Suite E • Baltimore, Maryland 21224

PHONE: (410) 633-4000
FAX (410) 633-4122

PRE-ABATEMENT CHECKLIST

Building: Mt Washington Clem. Date: 12-29-93

Location: Mt Washington Balto City

Project Description: Remove all ACM from the water storage tank behind boiler #1

Company Performing Abatement: Maxon -

Supervisor on Job: Kamsky Title: Supervisor.

Performance Specification Prepared By: Baltimore City,

Final Cleanliness Specification: Co. Sp. Prepared By: Balto City

WORK SITE PREPARATION	Acceptable	Not Acceptable	Not Applicable	Problem Encountered / Comments
A. AREA NON-ACCESSIBLE TO GENERAL PUBLIC	☑	☐	☐	
B. SIGNAGE				
1. Proper caution signs at entrances and exits	☑	☐	☐	
2. Dumpster Labeled	☐	☐	☑	
C. AIRLOCK-DECONTAMINATION AREA				
1. Clean Room – 1st Stage				
a. Lockers/clothing storage provided	☑	☐	☐	
b. Double plastic flaps at entrance and exit	☐	☐	☑	
2. Shower Area – 2nd Stage				
a. Shower operating	☑	☐	☐	
b. Shower waste water properly filtered	☑	☐	☐	
c. Double plastic flaps at entrance and exit	☑	☑	☐	
d. Clean towels available	☑	☐	☐	
3. Equipment Room – 3rd Stage				
a. Double plastic flaps at entrance and exit	☑	☑	☐	
b. Labeled bag for disposal of used suits	☑	☐	☐	
D.PERIMETER BARRIER PREPARATION				
1. 6 ml plastic used	☑	☐	☐	
2. Floor plastic (2 layers)	☑	☐	☐	
3. Wall plastic	☑	☐	☐	
4. Proper sealing of:				
a. Doors	☐	☐	☑	
b. Windows	☐	☐	☑	
c. Ventilation Systems	☐	☐	☑	
1. Vents	☐	☐	☑	
2. Ducts	☐	☐	☑	
3. Grills	☐	☐	☑	
4. System turned off	☐	☐	☑	
d. Pipes and conduit	☑	☐	☑	
e. Light Fixtures	☑	☐	☐	
f. Sprinkler Heads	☑	☐	☐	
g. All other openings into work area	☑	☐	☐	
5. Penetrations through ceiling properly sealed	☑	☐	☐	

(Complete Page Two)

PRE-ABATEMENT CHECKLIST

Date: 12-29-93

E. ABATEMENT EQUIPMENT

1. H.E.P.A. Filtered Vacuums
   a. Number of units: 1
   b. Type: Hako
2. H.E.P.A. Ventilation Units
   a. Number of units: 1
   b. Type: _____
   c. Operating: _____ ☑ Yes ☐ No
   d. H.E.P.A. filters present: _____ ☑ Yes ☐ No
   e. Exhausted out of work area: _____ ☑ Yes ☐ No
   f. Negative pressure inside work area:

Measurement	Inches H_2O	Location
No measuring devices		

3. Water hoses present ☑ Yes ☐ No
4. Amended water sprayers present ☑ Yes ☐ No
5. Surfactant present ☑ Yes ☐ No
6. Type of encapsulant to be used 32-32
7. Any other equipment to be used

F. WORKER PROTECTION

1. Respiratory Protection
   a. Type of respirators to be used: 1/2 Face Comfo II
   b. Are respirators NIOSH/MSHA approved? ☑ Yes ☐ No
2. If jurisdiction requires licensing, do all workers have proper identification to perform asbestos removal? ☑ Yes ☐ No
3. Proper Protective Clothing
   ☑ Full body overalls ☑ Hard hats
   ☑ Head covers ☐ Eye protection n/a
   ☑ Foot covers ☐ _____
4. Proper area for changing, eating, resting? ☑ Yes ☐ No

G. VERIFICATION OF WASTE DISPOSAL SITE ☑ Yes ☐ No

Name and Location: Marion Storage

H. AUTHORIZATION TO PROCEED:

Date: 12-29-93 Time: 430 pm will start 12-30-93

Inspector: Michael Pinzino Signature: Michael Pinzino

Title: TH Tech.

Authorization Given To: Kamula

Witness(es): _____

I H SERVICES, INC.

DAILY ASBESTOS ABATEMENT CHECKLIST

Building: Mt Washington Elem Date: 12-3-93

Location: Mt Washington Ave, Baltimore Maryland

Project Description: Remove all Asb Insulation from a 3000 gal water storage tank behind bldg #1

Company Performing Abatement: Marcon.

Supervisor on Job: Kravitz Title: Supervisor.

Number of Workers at Site: 3

Inspector: Michael Pangrazio Signature:

Title: I.H. Tech.

WORK SITE INSPECTION

	Acceptable	Not Acceptable	Not Applicable	Problem Encountered / Comments
A. AIRLOCK - DECONTAMINATION AREA				
1. Clean Room - 1st Stage				
a. Floors clean	☑	☐	☐	
b. No asbestos or asbestos-contaminated material present	☑	☐	☐	
c. Street clothes properly stored	☑	☐	☐	
2. Shower Area - 2nd Stage				
a. Shower operating	☑	☐	☐	
b. Shower waste water properly filtered	☑	☐	☐	
3. Equipment Area - 3rd Stage				
a. No excess asbestos debris present	☑	☐	☐	
b. Contaminated suits and material placed in asbestos bag	☑	☐	☐	
4. Airlock perimeter plastic and plastic flaps intact	☑	☐	☐	
5. Proper signage at entrance	☑	☐	☐	
B. PERIMETER BARRIERS				
1. Perimeter plastic intact	☑	☐	☐	
2. Windows and doors sealed	☐	☐	☑	
3. Ducts, ventilator systems, pipes sealed	☑	☐	☐	
4. All other vertical and horizontal openings into area sealed	☑	☐	☐	
C. WORK AREA PRACTICES				
1. Hammers, saws, brooms not in use	☑	☐	☐	
2. Material kept wet	☑	☐	☐	
3. Material bagged promptly	☑	☐	☐	
4. Workers protective equipment	☑	☐	☐	
a. Full body disposable clothing intact	☑	☐	☐	
b. Proper foot protection	☑	☐	☐	
c. Proper NIOSH respirators	☑	☐	☐	
Type: 1/2 Face Cartridge				
d. Hard hats	☐	☐	☑	
e. Eye protection	☐	☐	☑	
5. Adequate lighting	☑	☐	☐	

DAILY ASBESTOS ABATEMENT CHECKLIST

Date: 2-2993

D. WORKER DECONTAMINATION & WORK HABITS

	Acceptable	Not Acceptable	Not Applicable	Problem Encountered / Comments
1. Workers shower upon leaving work area	☑	☐	☐	
2. Contaminated full body suits bagged in dirty room	☑	☐	☐	
3. Disposable suits used once	☑	☐	☐	
4. No smoking in work area or airlock	☑	☐	☐	
5. No eating or drinking in work area or airlock	☑	☐	☐	

E. H.E.P.A. VENTILATION UNITS

1. Number in use 1
2. Pre-filters changed periodically ☑ Yes ☐ No
3. Negative Pressure Inside Work Area:
   a. Measured with:
      ☐ 1. Magnahelic gauge NA
      ☐ 2. Transducer
   b. Locations(s) and Negative Pressure Reading:

	Location	Inches H_2O
#1		
#2		
#3		

4. Is microtrap exhaust properly vented? ☑ Yes ☐ No
5. Is microtrap exhaust hose intact? ☑ Yes ☐ No

F. END OF WORK DAY PROCEDURES

	Acceptable	Not Acceptable	Not Applicable	Problem Encountered / Comments
1. Material on floors bagged before leaving area	☑	☐	☐	
2. Bags of asbestos sealed	☑	☐	☐	
3. If bags are removed:				
a. Properly decontaminated	☑	☐	☐	
b. Tightly sealed	☑	☐	☐	
c. Placed in drums	☐	☐	☑	
4. Are microtraps left running over night	☑	☐	☐	
5. Work area properly sealed off	☑	☐	☐	

G. AIR SAMPLING

	AREA	PERSONAL
1. Number of Air Samples taken	6	2
2. Number of Air Samples taken by Contractor	2	2

H. What is the daily job progress?

Men to be done set-up they will started work on 2-3-93 and finish all work the same day.

I H SERVICES, INC.

1831 Portal Street — Suite E • Baltimore, Maryland 21224

Main Office
410-633-4000
FAX
410-633-4122

AIR MONITORING DATA SHEET

Project: MS Washington Elem.
Address:
Date: 12-29-93
Activity: Mention Removal
Job Number:
Work Order Number:

SAMPLED FOR:

- [x] Asbestos: METHOD [x] 7400 [ ] TEM CASSETTE [x] 25mm [ ] 37mm FILTER [ ] MCE [x] PC
- [ ] Airborne Dust:
- [ ] Gas:
- [ ] Vapor:
- [ ] Other:

Analytical Method: _____ Ambient Temp.: _____

Protection Worn During Sampling:

	Employee	IH
Full Body Coveralls	[x]	[x]
Respirator - Air Purifying	[ ]	[ ]
Respirator - Power Air Purifying	[ ]	[ ]
Respirator - Supplied Air	[ ]	[ ]

PERSONAL SAMPLING DATA

Employee Sampled: N/A
Social Security Number:
Smoker: [ ] Yes [ ] No
Job Function:
Description of Activity:

Signature of Employee: _____

LAB ID	SAMPLE NO.	SAMPLE DATE	RESULTS FIBERS/CC	SAMPLE LOCATION
MD-662	MW001	12/29/93	Q	BLANK
MD-663	MW002	12/29/93	Q	BLANK
MD-664	MW 003	12/29/93	LO-01	Pre Sample - by the area of the Stanchion
MD-665	MW-004	12/29/93	LO-01	Pre Sample behind boilers 1+2 During set up.
MD-666	MW005	12/29/93	LO-01	Area by Boiler #2 During set up of the Containment
MD-667	MW006	12/29/93	LO-01	Behind Boiler #2 During set up.
MD-668	MW-007	12/29/93	LO-01	In Front of boiler #1 During set up.

FIELD SAMPLE NUMBER	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING START (LITERS/MIN.)	FLOW RATE SETTING STOP (LITERS/MIN.)	VOLUME LITERS	SAMPLE TYPE AMBIENT	SAMPLE TYPE AREA	SAMPLE TYPE FINAL	SAMPLE TYPE PERSONAL	SAMPLE LOCATION IN WORK AREA	SAMPLE LOCATION OUTSIDE WORK AREA	SAMPLE LOCATION N/A	INSTRUMENT SERIAL NUMBER
N/A-001	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MW-002	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MW-003	920	1050	90	10	10	900		✓						0169
MW-004	925	1055	90	10	10	900		✓						0154
MW-005	1100	100	90	10	10	900		✓						0169
MW-006	1105	105	90	10	10	900		✓						0154
MW-007	120	320	90	10	10	900		✓						0169

Comments:

Inspector: M. Dacpster (PRINT NAME)
(SIGNATURE)
Date: 12-29-93

I H SERVICES, INC.

1831 Portal Street — Suite E • Baltimore, Maryland 21224

Main Office
410-633-4000
FAX
410-633-4122

AIR MONITORING DATA SHEET

Project: Mt. Washington Elem

Address:

Date: 12-29-93

Activity:

Job Number:

Work Order Number:

SAMPLED FOR:

- [x] Asbestos: METHOD [x] P400 [ ] TEM CASSETTE [x] 25mm [ ] 37mm FILTER [ ] MCE [ ] PC
- [ ] Airborne Dust:
- [ ] Gas:
- [ ] Vapor:
- [ ] Other:

Analytical Method: Ambient Temp.:

Protection Worn During Sampling:

	Employee	IH
Full Body Coveralls	[ ]	[ ]
Respirator - Air Purifying	[ ]	[ ]
Respirator - Power Air Purifying	[ ]	[ ]
Respirator - Supplied Air	[ ]	[ ]

PERSONAL SAMPLING DATA

Employee Sampled: N/A

Social Security Number:

Smoker: [ ] Yes [ ] No

Job Function:

Description of Activity:

Signature of Employee:

LAB ID	SAMPLE NO.	SAMPLE DATE	RESULTS FIBERS/CC	SAMPLE LOCATION
MD-669	MW-008	12/28/93	20.01	behind Balcon #1 During setup.

FIELD SAMPLE NUMBER	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING START (LITERS/MIN.)	FLOW RATE SETTING STOP (LITERS/MIN.)	VOLUME LITERS	SAMPLE TYPE AMBIENT	SAMPLE TYPE AREA	SAMPLE TYPE FINAL	SAMPLE TYPE PERSONAL	SAMPLE LOCATION IN WORK AREA	SAMPLE LOCATION OUTSIDE WORK AREA	SAMPLE LOCATION N/A	INSTRUMENT SERIAL NUMBER
MW-008	125	225	90	10	10	900		✓						0154

Comments: MW #8 complete set up will start Removal 12-30-93

Inspector: Mike Dangino (PRINT NAME)

Mike Dangino (SIGNATURE)

Date: 12-29-93

I H SERVICES, INC.

1831 Portal Street – Suite E • Baltimore, Maryland 21224

PHONE: (410) 633-4000
FAX (410) 633-4122

CHAIN OF CUSTODY FOR ANALYTICAL SERVICES

No. 2180

Submittal Date: 12-29-93 Submitted By: (Print) M. Dompiano (Sign)

Client Name: Marian

Address: Maryland

Project Name: Mt Wash Elem

Address: Mt. Washington

Telephone:

Contact Person: Kamala

Results Required by: 12 / 29 / 93

Before Noon? ☐ Yes ☑ No

Number of Samples: 6

Type of Samples: ☑ Air ☐ Bulk ☐ Wipe ☐ Other:

Release Criteria: ☐ AHERA ☑ 0.010 f/cc ☐ % Asbestos ☐ Other:

LAB ID	SAMPLE NUMBER	DATE	VOLUME (Liters)	METHOD (Check) PCM	PLM	TEM	SEM	OTHER
MD-1602	MW-001	12-29-93	—	✓				
MD-1603	MW-002		—	✓				
MD-1604	MW-003		900	✓				
MD-1605	MW-004		900	✓				
MD-1606	MW-005		900	✓				
MD-1607	MW-006		900	✓				
MD-1608	MW-007	"	900	✓				
MD-1609	MW-008	12-29-93	900	✓				

Relinquished By: (Signature)	Date	Relinquished By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time
Received By: (Signature)	Date	Received By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time

LABORATORY STAFF ONLY: (CUSTODY)

1. Date/Time Received 12 / 29 / 93 @ 330 by (Print) Sign
2. Date/Time Analyzed 12 / 29 / 93 @ 350 by (Print) Sign
3. Date/Time Reported 12 / 29 / 93 @ 430 by (Print) Sign
4. Results Reported To: Kamala by (Print) Sign

I H SERVICES, INC.

1831-E Portal Street • Baltimore, Maryland 21224

PHONE: (410) 633-4000

FAX: (410) 633-4122

DAILY OBSERVATIONS

Page _____ of _____

DATE: 12-30-93 INSPECTOR: Michael Dayise

SITE: Mt Washington Elem. Mt Washington Baltimore Maryland TITLE: I.H. Tech

PURPOSE OF VISIT:

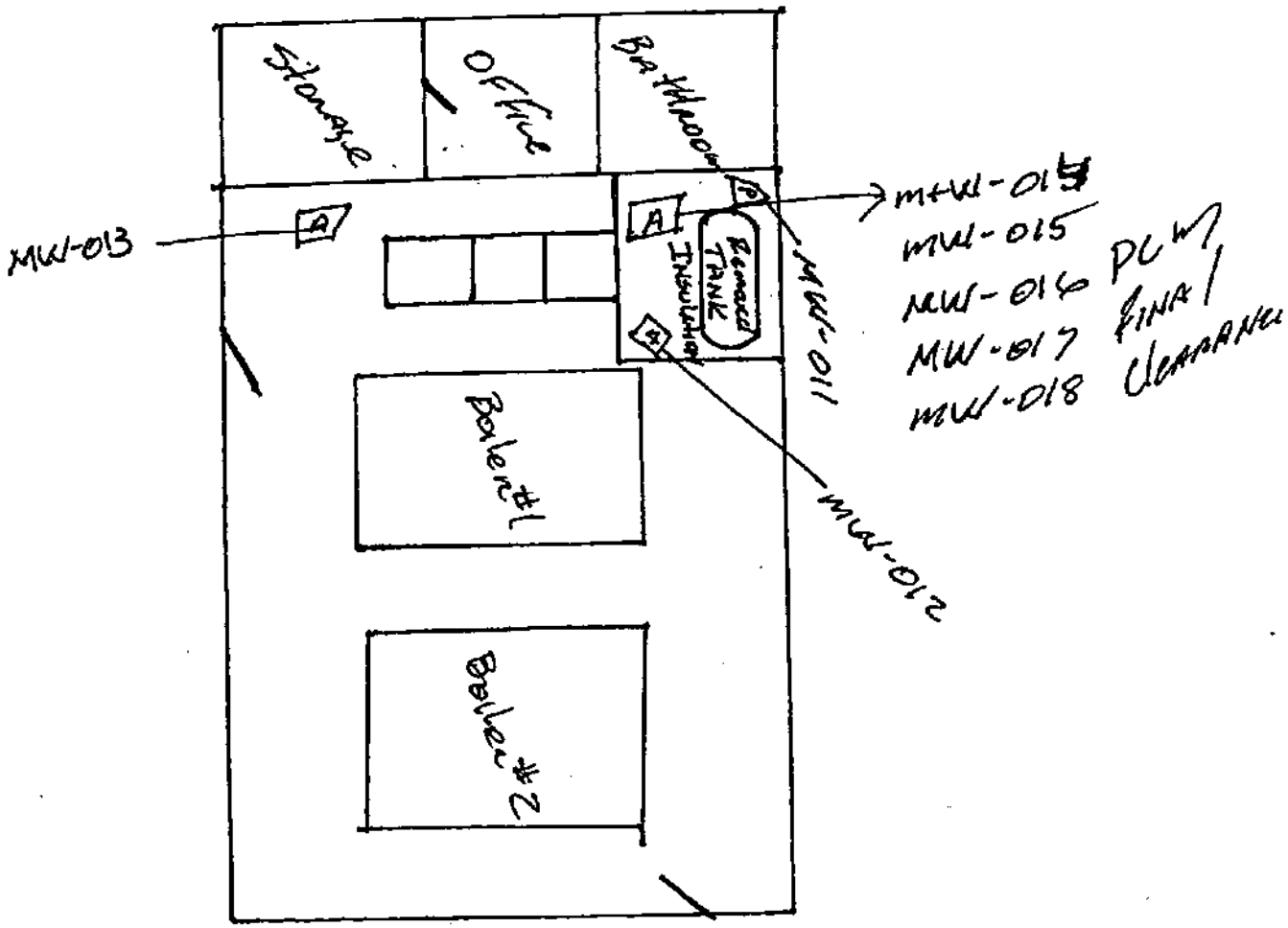
Monitor the Removal of ACM Insulation from the water storage tank in the boiler Room behind boiler #1

GENERAL OBSERVATIONS:

Arrived on sit + man started suiting up. Started a B2 sample and area samples. Inspected the permeter of the work area while men were going in. workers had all the material off the Tank bagged up and bagged out in 2 hrs. I inspected the area + had them clean up some debris. Had men cap the area. Let the area sit for 20 min and started my PC samples. Stopped my PC samples reset them and Informed men they could teardown anytime. Gathered my equipment + left job site.

DATE: 12-30-93

GENERAL OBSERVATIONS CONTINUED:



(B) BLANK - MW-009

(B) BLANK - MW-010

[A] AREA

(A) PERSONAL

(F) FINAL CLEARANCE.

I H SERVICES, INC.

DAILY ASBESTOS ABATEMENT CHECKLIST

Building: Mt. Washington Elem Date: 12-3-97

Location: Mt Washington Baths Mdy

Project Description: Remove Asbestos around water storage tank behind boiler #1 in the boiler Room.

Company Performing Abatement: Malcon

Supervisor on Job: Kamuda Title: Supervisor

Number of Workers at Site: 3

Inspector: M. Dimpsey Signature: M. Dimpsey

Title: I.H. Tech.

WORK SITE INSPECTION

A. AIRLOCK - DECONTAMINATION AREA	Acceptable	Not Acceptable	Not Applicable	Problem Encountered / Comments
1. Clean Room - 1st Stage				
a. Floors clean	☑	☐	☐	
b. No asbestos or asbestos-contaminated material present	☑	☐	☐	
c. Street clothes properly stored	☑	☐	☐	
2. Shower Area - 2nd Stage				
a. Shower operating	☑	☐	☐	
b. Shower waste water properly filtered	☑	☐	☐	
3. Equipment Area - 3rd Stage				
a. No excess asbestos debris present	☑	☐	☐	
b. Contaminated suits and material placed in asbestos bag	☑	☑	☐	
4. Airlock perimeter plastic and plastic flaps intact	☑	☐	☐	
5. Proper signage at entrance	☑	☐	☐	
B. PERIMETER BARRIERS				
1. Perimeter plastic intact	☑	☐	☐	
2. Windows and doors sealed	☐	☐	☑	
3. Ducts, ventilator systems, pipes sealed	☑	☐	☐	
4. All other vertical and horizontal openings into area sealed	☑	☐	☐	
C. WORK AREA PRACTICES				
1. Hammers, saws, brooms not in use	☑	☐	☐	
2. Material kept wet	☑	☐	☐	
3. Material bagged promptly	☑	☐	☐	
4. Workers protective equipment	☑	☐	☐	
a. Full body disposable clothing intact	☑	☐	☐	
b. Proper foot protection	☑	☐	☐	
c. Proper NIOSH respirators	☑	☐	☐	
Type: 7200 Full Face Combo II				
d. Hard hats	☐	☐	☑	
e. Eye protection	☐	☐	☑	
5. Adequate lighting	☑	☐	☐	

DAILY ASBESTOS ABATEMENT CHECKLIST

Date: 12-30-93

D. WORKER DECONTAMINATION & WORK HABITS	Acceptable	Not Acceptable	Not Applicable	Problem Encountered / Comments
1. Workers shower upon leaving work area	☑	☐	☐	
2. Contaminated full body suits bagged in dirty room	☑	☐	☐	
3. Disposable suits used once	☑	☐	☐	
4. No smoking in work area or airlock	☑	☐	☐	
5. No eating or drinking in work area or airlock	☑	☐	☐	

E. H.E.P.A. VENTILATION UNITS

1. Number in use 1
2. Pre-filters changed periodically ☑ Yes ☐ No
3. Negative Pressure Inside Work Area:
   a. Measured with: N/A
      ☐ 1. Magnahelic gauge
      ☐ 2. Transducer
   b. Locations(s) and Negative Pressure Reading:

Location	Inches H_2O
#1	
#2	
#3	

4. Is microtrap exhaust properly vented? ☑ Yes ☐ No
5. Is microtrap exhaust hose intact? ☑ Yes ☐ No

F. END OF WORK DAY PROCEDURES	Acceptable	Not Acceptable	Not Applicable	Problem Encountered / Comments
1. Material on floors bagged before leaving area	☑	☐	☐	
2. Bags of asbestos sealed	☑	☐	☐	
3. If bags are removed:				
a. Properly decontaminated	☑	☐	☐	
b. Tightly sealed	☑	☐	☐	
c. Placed in drums	☐	☐	☑	
4. Are microtraps left running over night	☑	☐	☐	
5. Work area properly sealed off	☑	☐	☐	

G. AIR SAMPLING	AREA	PERSONAL
1. Number of Air Samples taken	7	1
2. Number of Air Samples taken by Contractor	02	02

H. What is the daily job progress?

Men Completed Removal in Approx 2hrs and bagged out while it inspected the area. Rec final Clearance & cleaned the area then they tore down.

I H SERVICES, INC.

1831 Portal Street — Suite E • Baltimore, Maryland 21224

Main Office
410-633-4000
FAX
410-633-4122

AIR MONITORING DATA SHEET

Project: Mt. Washington Elem
Address:
Date: 12-30-93
Activity: Mowler Insulation Removal
Job Number:
Work Order Number:

SAMPLED FOR:

- [x] Asbestos: METHOD [x] 7400 [ ] TEM CASSETTE [x] 25mm [ ] 37mm FILTER [ ] MCE [x] PC
- [ ] Airborne Dust:
- [ ] Gas:
- [ ] Vapor:
- [ ] Other:

Analytical Method: Ambient Temp.:

Protection Worn During Sampling:

	Employee	IH
Full Body Coveralls	[x]	[x]
Respirator - Air Purifying	[x]	[x]
Respirator - Power Air Purifying	[ ]	[ ]
Respirator - Supplied Air	[ ]	[ ]

PERSONAL SAMPLING DATA

Employee Sampled: X Phan Lem
Social Security Number: X 546 67 3542
Smoker: [ ] Yes [ ] No
Job Function: Asbestos Tech.
Description of Activity: Glass Removal + Fine clean.
Signature of Employee: X Phan Lem

LAB ID	SAMPLE NO.	SAMPLE DATE	RESULTS FIBERS/CC	SAMPLE LOCATION
MD-670	MW-009	12/30/93	∅	BLANK
MD-671	MW-010	12/30/93	∅	BLANK
MD-672	MW-011	12/30/93	.035	Personal - Phan Lem
MD-673	MW-012	12/30/93	.02	Inside w/a left side of the water tank
MD-674	MW-013	12/30/93	<0.01	outside w/a by the Entrance & the containment.
MD-675	MW-014	12/30/93	<0.01	Final Clearance. In w/a next to the water tank
MD-676	MW-015	12/30/93	<0.01	Final Clearance In w/a next to the water tank.

FIELD SAMPLE NUMBER	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING START (LITERS/MIN.)	FLOW RATE SETTING STOP (LITERS/MIN.)	VOLUME LITERS	SAMPLE TYPE AMBIENT	SAMPLE TYPE AREA	SAMPLE TYPE FINAL	SAMPLE TYPE PERSONAL	SAMPLE LOCATION IN WORK AREA	SAMPLE LOCATION OUTSIDE WORK AREA	SAMPLE LOCATION N/A	INSTRUMENT SERIAL NUMBER
MW-009	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MW-010	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MW-011	910	1130	140	2.0	2.0	280				✓	✓			0247
MW-012	915	1130	135	2.0	2.0	270		✓			✓			0217
MW-013	925	1125	120	10	10	1200		✓	✓			✓		0169
MW-014	1210	210	120	10	10	1200			✓		✓			0169
MW-015	1210	210	120	10	10	1200			✓		✓			0154

Comments:

Inspector: M. DeMarco (PRINT NAME)
(SIGNATURE)
Date: 12-30-93

I H SERVICES, INC.

1831 Portal Street — Suite E • Baltimore, Maryland 21224

Main Office
410-633-4000
FAX
410-633-4122

AIR MONITORING DATA SHEET

Project: Mt. Washington Elem.
Address:
Date: 12-30-93
Activity: Asbestos Removal
Job Number:
Work Order Number:

SAMPLED FOR:

- [x] Asbestos: METHOD [x] 7400 [ ] TEM; CASSETTE [x] 25mm [ ] 37mm; FILTER [ ] MCE [x] PC
- [ ] Airborne Dust:
- [ ] Gas:
- [ ] Vapor:
- [ ] Other:

Analytical Method: Ambient Temp.:

Protection Worn During Sampling:

	Employee	IH
Full Body Coveralls	☑	☑
Respirator - Air Purifying	☑	☑
Respirator - Power Air Purifying	☐	☐
Respirator - Supplied Air	☐	☐

PERSONAL SAMPLING DATA

Employee Sampled:
Social Security Number:
Smoker: ☐ Yes ☐ No
Job Function:
Description of Activity:

Signature of Employee:

LAB ID	SAMPLE NO.	SAMPLE DATE	RESULTS FIBERS/CC	SAMPLE LOCATION
no-167	MW-016	12/30/93	LO.01	FINAL - Inside the Containment next to the tank
no-168	MW-017	12/30/93	LO.01	FINAL - Next to tank Inside the Containmet.
no-169	MW-018	12/30/93	LO.01	FINAL - Inside the containmet. next to the TANK

FIELD SAMPLE NUMBER	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING START (LITERS/MIN.)	FLOW RATE SETTING STOP (LITERS/MIN.)	VOLUME LITERS	SAMPLE TYPE AMBIENT	SAMPLE TYPE AREA	SAMPLE TYPE FINAL	SAMPLE TYPE PERSONAL	SAMPLE LOCATION IN WORK AREA	SAMPLE LOCATION OUTSIDE WORK AREA	SAMPLE LOCATION N/A	INSTRUMENT SERIAL NUMBER
MW-016	1210	210	120	10	10	1200			✓		✓			0249
MW-017	1210	210	120	10	10	1200			✓		✓			0125
MW 018	1210	210	120	10	10	1200			✓		✓			0163

Comments:

Inspector: (PRINT NAME) (SIGNATURE)

Date: 12-30-93

I H SERVICES, INC.

1831-E Portal Street • Baltimore, Maryland 21224

PHONE: (410) 633-4000
FAX (410) 633-4122

FINAL ABATEMENT CHECKLIST

Building: Mt. Washington Elem Date: 12-30-93

Location: Mt Washington Balto MD.

Project Description: Remove Asb Insul from the water Storage tank behind boiler #1

Company Performing Abatement: MANCON.

Inspector: M. Dunford Signature: M. D

Title: I.H. Tech.

Accompanied By: Kendall Title: Supervisor

Time of Inspection: Start: 1120 AM Stop: 1135 AM

A. VISUAL INSPECTION OF WORK AREA

The following areas have been wet cleaned and/or H.E.P.A. vacuumed and seen to contain no residual dust and debris:

WORK SITE INSPECTION	Acceptable	Not Acceptable	Not Applicable	Problem Encountered / Comments
1. Floors	☑	☐	☐	
2. Walls	☑	☐	☐	
3. Window Ledges	☐	☐	☑	
4. Pipes:				
a. Vertical	☑	☐	☐	
b. Horizontal	☑	☐	☐	
b. Pipe Hangers	☑	☐	☐	
5. Ventilation Equipment	☑	☐	☐	
6. Ducts	☐	☐	☑	
7. Registers	☐	☐	☑	
8. Lights	☑	☐	☐	
9. Conduit and Wires	☑	☐	☐	
10. Sprinkler Heads	☐	☐	☑	
11. Fire Alarms	☐	☐	☑	
12. Electrical Panels and Boxes	☐	☐	☑	
13. All Other Horizontal Surfaces	☑	☐	☐	
14. All Other Vertical Surfaces	☑	☐	☐	
15. Removal Equipment Remaining in Work Areas	☑	☐	☐	
16. Areas Adjacent To Work Site Barrier	☑	☐	☐	

B. ENCAPSULATION

1. Has encapsulant been used? ☑ Yes ☐ No
2. Name of encapsulant used: 32-32

(Complete Page Two)

Date: 12-30-93

C. Have all bags of removal debris been properly labeled and removed from work area? ☑ Yes ☐ No

D. FINAL AIR SAMPLING

1. Sample I.D. Number(s): MW-014 to MW-018
2. Were samples analyzed on site? ☑ Yes ☐ No
3. If yes, person performing analysis: M. DiPino
4. Was a blank submitted? ☑ Yes ☐ No
5. Is electron microscopy required? ☐ Yes ☑ No
6. What is the specified clearance level? ☑ f/cc ☐ s/mm² 0.01
7. Were microtraps run during the taking of final air samples? ☑ Yes ☐ No
8. Were any other aggressive sampling techniques used? ☐ Yes ☑ No

   Describe: Leaf Blowers

E. RESULTS OF VISUAL INSPECTION

The work area was found to be acceptably free of residual dust and debris: ☑ Yes ☐ No

Inspector: M. DiPino Signature: M. D

Date: 12-30-93 Time: 245 pm

F. RESULTS OF AIR TEST(s)

Sample I.D.	Result	Sample I.D.	Result	Sample I.D.	Result
MW-009	0	MW-014	0.01		
MW-010	0	MW-015	0.01		
MW-011	.035	MW-016	0.01		
MW-012	.027	MW-017	0.01		
MW-013	0.01	MW-018	0.01		

Are these results below the final clearance level? ☑ Yes ☐ No

Has the work area been released? ☐ Yes ☐ No

Notification Given To: K Arnold Title: Supervisor

Date of Notification: 12-30-93 Time: 246 pm

Microscopist: M. DiPino Signature: M. D

G. Has the contractor been informed to clean all contamination left behind barriers? ☑ Yes ☐ No

H. Final Cleanliness Specification: 0.01 Prepared by: Balto Cty

Has analysis of final samples met speciofied level of cleanliness? ☐ Yes ☐ No

I H SERVICES, INC.

1831 Portal Street – Suite E • Baltimore, Maryland 21224

PHONE: (410) 633-4000
FAX (410) 633-4122

CHAIN OF CUSTODY FOR ANALYTICAL SERVICES

№ 2181

Submittal Date: 12-30-93 Submitted By: (Print) M. Dangelo (Sign) M. D

Client Name: Mancon

Address: Maryland

Telephone:

Project Name: Mt Washington

Address: Elem. Mt Wash Balto Md.

Contact Person: Kamala

Results Required by: 12 / 30 / 93

Before Noon? ☐ Yes ☒ No

Number of Samples: 10

Type of Samples: ☒ Air ☐ Bulk ☐ Wipe ☐ Other:

Release Criteria: ☐ AHERA ☒ 0.010 f/cc ☐ % Asbestos ☐ Other:

LAB ID	SAMPLE NUMBER	DATE	VOLUME (Liters)	METHOD (Check)				OTHER
				PCM	PLM	TEM	SEM	
MD-670	MW - 009	12-30-93	0	✓	✓			
MD 671	MW - 010	12-30-93	0	✓	✓			
MD 672	MW - 011		280	✓	✓			
MD 673	MW - 012		220	✓	✓			
MD 674	MW - 013		1200	✓	✓			
MD 675	MW - 014		1200	✓	✓			
MD 676	MW - 015		1200	✓	✓			
MD 677	MW - 016		1200	✓	✓			
MD 678	MW - 017		1200	✓	✓			
MD 679	MW - 018	12-30-93	1200	✓	✓			

Relinquished By: (Signature)	Date	Relinquished By: (Signature)	Date
M. D	12-30-93	M. D	12-30-93
Name: (Printed)	Time	Name: (Printed)	Time
Received By: (Signature)	Date	Received By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time

LABORATORY STAFF ONLY: (CUSTODY)

1. Date/Time Received 12 / 30 / 93 @ 245 by (Print) M. Pangelo Sign M. D
2. Date/Time Analyzed 12 / 30 / 93 @ 245 by (Print) Sign
3. Date/Time Reported 12 / 30 / 93 @ 245 by (Print) Sign
4. Results Reported To: Kamala by (Print) Sign

IV TEST RESULTS

This section contains certificates of analyses for all testing performed.

I H SERVICES, INC.

1831 Portal Street — Suite E • Baltimore, Maryland 21224

Main Office
410-633-4000
Fax
410-633-4122

REPORT OF ANALYSIS

Report No. 3-509 Report Date: December 31, 1993

Report To: Marcor Environmental Page: 1 of 1

Sample I.D. Mt. Washington Elementary School #221

Sample No.	Lab I.D.	Sample Date	Volume (L)	Fibers/cc
MW-001	MD662	12/29/93	Blank	0 Fibers/ 100 Fields
MW-002	MD663	12/29/93	Blank	0 Fibers/ 100 Fields
MW-003	MD664	12/29/93	900	<0.010*
MW-004	MD665	12/29/93	900	<0.010*
MW-005	MD666	12/29/93	900	<0.010*
MW-006	MD667	12/29/93	900	<0.010*
MW-007	MD668	12/29/93	900	<0.010*
MW-008	MD669	12/29/93	900	<0.010*
MW-009	MD670	12/30/93	Blank	0 Fibers/ 100 Fields
MW-010	MD671	12/30/93	Blank	0 Fibers/ 100 Fields
MW-011	MD672	12/30/93	280	0.035
MW-012	MD673	12/30/93	270	0.027
MW-013	MD674	12/30/93	1200	<0.010*
MW-014	MD675	12/30/93	1200	<0.010*
MW-015	MD676	12/30/93	1200	<0.010*
MW-016	MD677	12/30/93	1200	<0.010*
MW-017	MD678	12/30/93	1200	<0.010*
MW-018	MD679	12/30/93	1200	<0.010*

* The limit of Quantitative Detection.

Method of Analysis: Fiber counts were determined by methods described in NIOSH Analytical Method 7400, "Asbestos Fibers in Air."

Stephen L. Law, Ph.D., CIH
President

V REFERENCES

1. USEPA 1985. "Guidance for Controlling Asbestos-Containing Materials in Buildings", EPA 560/5-85-024. U.S. Environmental Protection Agency, Exposure Evaluation Division, Office of Pesticides and Toxic Substances, Washington, D.C.

2. USEPA 1984. "Measuring Airborne Asbestos Following an Abatement Action", EPA 600/4-85-049. U.S. Environmental Protection Agency Exposure Evaluation Division, Office of Pesticides and Toxic Substances, Washington, D.C.

3. OSHA 1986. "OSHA Reference Method - Mandatory", Appendix A to 1910.1001, Federal Register, Vol. 51, No. 119, June 20, 1986; Sept. 14, 1988. Final Rules 29 CFR 1926.58 Amended Sept. 14, 1988.

4. USEPA 1987. "Asbestos-Containing Materials in Schools: Final Rule and Notice", 40 CFR Part 763, Federal Register, Vol. 52, No. 210, Friday, October 30, 1987.

EMPLOYEE #	EMPLOYEE NAME	CERT. #	CERT DATE	DESCRIPTION
002030	Balonis, Robin	13087	01-12-94	8 hour Sup. refresher
002268	Billings, Donald	2770	08-06-92 to 08-06-93	24 hour Worker initial training
002493	Bounsyhavong, Nophon	10189	06-15-93	8 hour Worker refresher
003500	Choi	13077	01-11-94	8 hour Worker refresher
003600	Coffey, Cheri	10314	07-12-93	8 hour Worker refresher
003674	Collins, Oliver	10176	06-15-94	8 hour Worker refresher
004900	Duong, Hung	14910	06-16-94	8 hour Worker refresher
005145	Eikenberg, Richard	10005	05-12-94	8 hour Supervisor refresher
006310	Farr, Walter	10108	06-03-93	8 hour Worker refresher
006350	Flemming, Ronald	3839	05-11-93	8 hour Worker refresher
006360	Flintall, Dwayne	2893	09-08-92	8 hour Worker refresher
006490	Franklin, Robert	3842	05-11-93	8 hour Worker refresher
007525	Gizara, Louis	12494	11-03-93	8 hour Supervisor refresher
007850	Haneiuxay, Noune	11237	09-08-93	8 hour Worker refresher
008100	Hartman, Scott	14192	03-09-94	8 hour Supervisor refresher
008120	Harvey, Ronald	14060	02-10-94	8 hour Supervisor refresher
008183	Hawkins, Roland	11173	08-24-93	8 hour Worker refresher
008595	Hopkins, Michael	14990	05-18-94	8 hour Supervisor refresher
008600	Howell, Kenneth	12539	11-24-93	8 hour Supervisor refresher
009592	Ishway, Samual	10481	08-10-93	8 hour Worker refresher
010400	Jinadu, Femi	10311	07-12-93	8 hour Worker refresher
010600	Johnson, William	2948	09-22-92	8 hour Worker refresher
010640	Jones, Mark	14987	05-17-94	8 hour Worker refresher
011075	Kelbaugh, James	14169	03-09-94	8 hour Supervisor refresher
011080	Keohanam, Khai	14160	03-08-94	8 hour Worker refresher
011083	Keohanam, Phath	14159	03-08-94	8 hour Worker refresher
111345	Keomany, Khamla	10164	06-15-93	8 hour Worker
011350	Khantry, Khamla	13088	01-12-94	8 hour Supervisor refresher
011750	Krivosh, Richard	14358	04-05-94	8 hour Worker refresher
013150	Maniphone, Billy	10325	07-12-93	8 hour Worker refresher
013190	McCargish, Jack	14992	05-18-94	8 hour Supervisor refresher
013196	McLamb, Cory	14985	05-17-94	8 hour Worker refresher
013405	Merritt, Edwin	13762	01-27-94	8 hour Supervisor refresher
013410	Merson, Jeffery	3844	05-11-93	8 hour Worker refresher
013420	Mesaler, John	16603	09-08-94	8 hour Worker refresher

EMPLOYEE #	EMPLOYEE NAME	CERT. #	CERT DATE	DESCRIPTION
013842	Morris, Keith	11172	08-24-93	8 hour Worker refresher
013850	Moto, Michael	10488	08-11-93	8 hour Supervisor refresher
014501	Neal, Joseph	10480	08-10-93	8 hour Worker refresher
014517	Nguyen, Thanh	14916	06-16-94	8 hour Worker refresher
115300	Noumelady, Jack	12490	11-02-93	8 hour Worker refresher
016100	Pamplin, Charles	3663	04-07-93	8 hour Supervisor refresher
016147	Parks, Gardner	11183	08-25-93	8 hour Supervisor refresher
016224	Phimphanh, Amphon	10232	06-16-93	8 hour Supervisor refresher
016225	Phimphanh, Cha	13078	01-11-94	8 hour Worker refresher
018020	Ragland, Michael	13073	01-11-94	8 hour Worker refresher
018050	Rainey, Charles	10319	07-12-93	8 hour Worker refresher
018122	Reils, Edward	2765	08-06-92 to 08-09-93	24 hour Worker initial
018124	Reils, George	10468	08-10-93	8 hour Worker refresher
019130	Scott, Frederick	10332	07-13-93	8 hour Supervisor refresher
019650	Smith, Henry	14716	04-20-94	8 hour Worker refresher
019740	Stein, Mark	13800	02-10-94	8 hour Supervisor refresher
019750	Stewart, Christopher	14710	04-20-94	8 hour Worker refresher
019760	Street, Dennis	13758	01-27-94	8 hour Supervisor refresher
019800	Summers, Roland	14856	02-10-94	8 hour Worker refresher
020220	Thepsouvanh, Bouloy	10323	07-12-93	8 hour Worker refresher
020230	Thepsouvanh, Somboun	10324	07-12-93	8 hour Worker refresher
020290	Thongdygnalat, C.	13079	01-11-94	8 hour Worker refresher
022650	Vongphakdy, Sack	10408	07-29-93	8 hour Supervisor refresher
123060	Wallace, David	10393	07-28-93	8 hour Worker refresher
023075	Washington, Zachary	13754	01-26-94	8 hour Worker refresher
023280	Wilson, Donald	16801	11-24-93	8 hour Worker refresher
023400	Witherspoon, Nathaniel	10328	07-12-93	8 hour Worker refresher
026153	Zambeli, Frank	14315	03-23-94	8 hour Supervisor refresher

AMENDMENT #9

June 1, 1998

AHERA

ASBESTOS CONTAINING MATERIALS

Management Plan

School No: PS221

School Name Mount Washington Elementary

Notice

No Asbestos Response Actions for the School for the period reported under this amendment attached.

Issued by

BALTIMORE CITY PUBLIC SCHOOLS

Asbestos Coordinator

Designated Local Education Agency Representative

City of Baltimore Public Schools
AMENDMENT #9
JUNE, 1998

INTRODUCTION

These amendments are issued annually to update the ASBESTOS MANAGEMENT PLAN for each building under the control of Baltimore City Public Schools.

Contents of each annual amendment will include:
Asbestos response actions for the (if any);

Table 1A containing the remaining quanities of asbestos containing material in the buillding;

Acopy of the survelliance logs for the building done at a minimum of a semi-annual basis;

any pertinent information.

An asbestos response action shall include any work to clean up asbestos in response to a major or minor fiber release episode, or any work action to remove, encapsulate, enclose, or repair asbestos containing materials.

Persons reading this amendment are encouraged to read the Asbestos Management Plan to thoroughly understand the location and extent of asbestos containing materials in the building.

David Mitchell
Baltimore City Asbestos Coordinator
and Designated LEA Representative

PLEASE POST PLEASE POST

City of Baltimore Public Schools
ASBESTOS PROGRAM

NOTICE TO SCHOOL BUILDING VISITORS AND OCCUPANTS (TEACHERS, STUDENTS, OPERATING ENGINEERS AND CUSTODIAL PERSONS) OF ASBESTOS MANAGEMENT PLAN AMENDMENT NUMBER 4 AND AVAILABILITY OF ASBESTOS MANAGEMENT PLAN FOR INSPECTION.

An amendment to the Asbestos Management Plan has been appended to the management plans for asbestos to be kept in the building administrative office. This is Amendment #4 and is dated December 4, 1992. This amendment is available for inspection by making request to the building principal.

EPA Rules for school buildings required:

(1) We maintain records on asbestos in each school;

(2) Inform our building occupants and visitors on asbestos in each school building of locations of and response actions for asbestos in each school;

(3) Give right-of-way to EPA and State of Maryland environmental inspectors.

Failure to fulfill the above may result in serious civil and possible criminal penalties assessed against the City for failure to perform the above including possible criminal penalties against persons who willfully avoid the EPA Rules.

If the Asbestos Management Plan and the Amendments to it are not available in your school from the principal report it to **Environmental Services - Asbestos Office at 396-7832** immediately.

David W. Mitchell
Baltimore City Asbestos Coordinator
and Designated LEA Representative

TABLE 1-A

Location: RS# 221

Removals

	Beg Yr 7/96	Removal	End Yr 6/97	Units
Spray On				sf
Tile				sf
Acoustic Plaster				sf
Other Plaster				sf
Wallboard				sf
Pipe	2530		2530	lf
Elbows Fittings	1410		1410	sf
Boilers Breeching	400		400	sf
Tanks				sf
Ductwork				lf
Other TSI				lf
Curtains				sf
Firedoors	126		126	sf
Cement Board				sf
VAT	3000		3000	sf
Decon				sf
Soil				sf
Misc Debris CY				cy

Repairs

Patch LF	
Encapsulate LF	
Encapsulate SF	
Patch SF	
Carpet SF	
Wire LF	
MiscLF	
MiscSF	

Versar INC.

ASBESTOS-CONTAINING MATERIALS MANAGEMENT PLAN AND APPENDICES A AND B

FOR

MOUNT WASHINGTON ELEMENTARY SCHOOL PS221

PREPARED FOR:

THE BOARD OF SCHOOL COMMISSIONERS
FOR THE CITY OF BALTIMORE

PREPARED BY:

VERSAR, INC.
6850 VERSAR CENTER
SPRINGFIELD, VA 22151

MAY 9, 1989

Versar INC.

The Designated LEA Representative, Mr. William A. Gieseking, certifies that the local educational authority (LEA) responsibilities as stipulated by Paragraph 763.84 of the Final Rule for Asbestos-Containing Materials in Schools (see Appendix B) have been met or will be met.

Signature: William A. Gieseking

Date: April 6, 1989

STATE OF MARYLAND TO WIT; CITY OF BALTIMORE.

I HEREBY CERTIFY THAT ON THIS **6th** day of **April**, 19**89**, before me, the Subscriber, a Notary Public of the State of Maryland in and for the City of Baltimore, personally appeared WILLIAM A. GIESEKING, Designated LEA Representative and he acknowledged the afore going certification to be his act.

WITNESS my hand and Notorial Seal.

Phyllis J. Karas

Phyllis J. Karas

Notary Public

My Commission Expires: **July 1, 1990**

BALTIMORE CITY SCHOOL MANAGEMENT PLAN LIST

ASBESTOS-CONTAINING BUILDING MATERIALS (ACBM) INVENTORY BY BUILDING

BULDING NUMBER *	BUILDING NAME	ADDRESS	FRIABLE ACBM	NON-FRIABLE ACBM	ASSUMED FRIABLE ACBM	ASSUMED NON-FRIABLE ACBM	NO ACBM FOUND	NO SUSPECT MATERIAL
PS004	STEWART HILL	30 S. GILMOR STREET	X	X		X		
PS005	LANGSTON HUGHES	5011 ARBUTUS AVENUE		X		X		
PS007	CECIL	2000 CECIL AVENUE	X	X		X		
PS008	CITY SPRING	100 S. CAROLINE STREET	X	X		X		
PS009	CARROLL PARK	1300 HERKIMER STREET	X			X		
PS010	JAMES McHENRY	31 S. SCHROEDER STREET	X			X		
PS011	EUTAW-MARSHBURN	1624 EUTAW PLACE	X			X		
PS011A	EUTAW-MARSHBURN	1624 EUTAW PLACE	X					
PS012	LAKELAND	2921 STRANDEN ROAD	X	X		X		
PS013	TENCH TILGHMAN	600 N. PATTERSON PARK A		X		X		
PS014	PARK HEIGHTS	4910 PARK HEIGHTS AVENUE		X	X			
PS016	JOHNSON SQUARE	1101 VALLEY STREET	X	X	X			
PS019	LEXINGTON TERRACE	732 W. LEXINGTON STREET	X			X		
PS021	HILTON	3301 CARLISLE AVENUE	X	X	X	X		
PS023	GENERAL WOLFE	245 S. WOLFE STREET		X	X			
PS024	WESTSIDE	2235 NORTH FULTON AVENUE	X	X		X		
PS025	DR. RAYNOR BROWNE	1000 N. MONTFORD AVENUE		X	X	X		
PS026	MADISON SQUARE	1401 E. BIDDLE STREET	X	X		X		
PS027	COMMODORE RODGERS	100 N. CHESTER STREET	X			X		
PS028	WILLIAM PINDERHUGHES	1200 N. FREMONT AVENUE		X		X		
PS029	MATHEW A. HENSON	1600 N. PAYSON STREET	X	X		X		
PS030	GEORGE STREET	601 N. BRUNE STREET	X	X	X	X		
PS031	COLDSTREAM PARK	400 EXETER HALL AVENUE	X	X		X		
PS032	MILDRED MONROE	1634 GUILFORD AVENUE	X	X		X		
PS034	BARRISTER CHARLES CARROLL	1327 WASHINGTON BOULEVARD		X		X		
PS035	HARLEM PARK	1401 W. LAFAYETTE AVENUE	X	X				
PS036	HARFORD HEIGHTS	1919 N. BROADWAY	X	X		X		
PS038	MALCOLM X	2810 SHIRLEY AVENUE	X	X		X		
PS039	DALLAS F. NICHOLAS, SR.	101 E. 21ST STREET		X		X		
PS040	LAKE CLIFTON	2801 SAINT LO DRIVE	X	X	X	X		
PS041	HAMILTON	5609 SEFTON AVENUE	X	X		X		
PS042A	GARRISON	3910 BARRINGTON ROAD	X		X			
PS042B	GARRISON	3910 BARRINGTON ROAD	X			X		
PS043	HAMPSTEAD HILL	101 S. ELLWOOD AVENUE	X	X	X			
PS044	MONTEBELLO	2040 E. 32ND STREET	X	X	X			
PS045	FEDERAL HILL	1040 WILLIAM STREET	X	X		X		
PS046	CHINQUAPIN	900 WOODBROUNE AVENUE	X	X		X		
PS047	HAMPSTEAD HILL	500 S. LINWOOD AVENUE	X	X		X		
PS049	NORTHEAST	5001 MORAVIA ROAD		X		X		
PS050	ADMINISTRATION	1300 GORSUCH AVENUE	X	X		X		
PS051	WAVERLY	3400 ELLERSLIE AVENUE	X	X		X		
PS051A	WAVERLY	3400 ELLERSLIE AVENUE					X	
PS051B	WAVERLY	3400 ELLERSLIE AVENUE					X	
PS051C	WAVERLY	3400 ELLERSLIE AVENUE					X	
PS051D	WAVERLY	3400 ELLERSLIE AVENUE					X	

BALTIMORE CITY SCHOOL MANAGEMENT PLAN LIST

ASBESTOS-CONTAINING BUILDING MATERIALS (ACBM) INVENTORY BY BUILDING

BULDING NUMBER *	BUILDING NAME	ADDRESS	FRIABLE ACBM	NON-FRIABLE ACBM	ASSUMED FRIABLE ACBM	ASSUMED NON-FRIABLE ACBM	NO ACBM FOUND	NO SUSPECT MATERIAL
PS053	MARGARET BRENT	2601 ST. PAUL STREET				X		
PS054	BARCLAY	2900 BARCLAY STREET	X	X		X		
PS055	HAMPDEN	3608 CHESTNUT AVENUE		X		X		
PS056	ROBERT POOLE	1300 W. 36TH STREET	X	X		X		
PS057	LOMBARD	1500 E. LOMBARD STREET	X	X		X		
PS058	ASHBURTON	3935 HILTON ROAD	X	X		X		
PS058A	ASHBURTON	3935 HILTON ROAD					X	
PS058B	ASHBURTON	3935 HILTON ROAD					X	
PS058C	ASHBURTON	3935 HILTON ROAD					X	
PS058D	ASHBURTON	3935 HILTON ROAD					X	
PS060	GWYNNS FALLS	2700 GWYNNS FALLS PARKWAY	X	X		X		
PS060A	GWYNNS FALLS	2700 GWYNNS FALLS PARKWAY		X		X		
PS060B	GWYNNS FALLS	2700 GWYNNS FALLS PARKWAY		X		X		
PS060C	GWYNNS FALLS	2700 GWYNNS FALLS PARKWAY				X		
PS061	JOHN EAGER HOWARD	2011 LINDEN AVENUE	X	X		X		
PS062	EDGECOMBE CIRCLE	2835 VIRGINIA AVENUE	X	X		X		
PS063	ROSEMONT	2777 PRESTMAN STREET	X	X		X		
PS064	LIBERTY	3901 MAINE AVENUE		X		X		
PS066	MOUNT ROYALE	121 MCMECHAN STREET	X	X		X		
PS067	EDGEWOOD	1900 N. EDGEWOOD STREET	X	X	X			
PS070	SOUTHERN	1100 COVINGTON STREET	X	X		X		
PS073	SARAH M. ROACH	3434 OLD FREDERICK ROAD	X	X		X		
PS075	CALVERTON	1100 WHITMORE AVENUE	X	X	X			
PS076N	FRANCIS SCOTT KEY	1425 EAST FORT AVENUE					X	
PS077	HERRING RUN	5001 SINCLAIR LANE	X	X		X		
PS078	HARLEM PARK	1500 HARLEM AVENUE	X	X	X	X		
PS079A	PORTABLE	2801 N. DUKE STREET	X		X			
PS079	WILLIAM H. LEMMEL	2801 N. DUKELAND STREET	X	X		X		
PS080	WEST BALTIMORE	201 N. BEND ROAD	X	X				
PS081	OFFICES (#81)	181 N. BEND STREET	X	X		X		
PS082	GREENSPRING	4701 GREENSPRING AVENUE	X			X		
PS083	WILLIAM PACA	200 N. LAKEWOOD AVENUE	X	X		X		
PS084	THOMAS JOHNSON	100 E. HEATH STREET	X	X		X		
PS085	FORT WORTHINGTON	2701 E. OLIVER STREET	X	X	X	X		
PS086	LAKEWOOD	2625 FEDERAL STREET	X			X		
PS087	WINDSOR HILLS	4001 ALTO ROAD	X	X	X			
PS088	LYNDHURST	621 WILDWOOD PARKWAY	X	X		X		
PS089	ROGNEL HEIGHTS	4300 SIDEHILL ROAD	X	X		X		
PS093	NORTHERN PARKWAY	2500 E. NORTHERN PARKWAY	X	X	X			
PS095	FRANKLIN SQUARE	1400 W. LEXINGTON STREET	X	X	X	X		
PS097	COLLINGTON SQUARE	1409 N. COLLINGTON AVENUE	X			X		
PS098	SAMUEL B.F. MORSE	424-426 S. PULASKI STREET		X	X			
PS101	ELMER A. HENDERSON	1101 N. WOLFE STREET	X	X		X		
PS102	THOMAS G. HAYES	601 CENTRAL AVENUE	X	X	X	X		
PS105	MORAVIA PARK	6201 FRANKFORD AVENUE	X	X		X		

BALTIMORE CITY SCHOOL MANAGEMENT PLAN LIST

ASBESTOS-CONTAINING BUILDING MATERIALS (ACBM) INVENTORY BY BUILDING

BULDING NUMBER *	BUILDING NAME	ADDRESS	FRIABLE ACBM	NON-FRIABLE ACBM	ASSUMED FRIABLE ACBM	ASSUMED NON-FRIABLE ACBM	NO ACBM FOUND	NO SUSPECT MATERIAL
PS107	GILMOR	1321 N. GILMOR STREET	X	X		X		
PS115	VENABLE	700 E. 34H STREET	X	X		X		
PS117	DUKE ELLINGTON	790 W. NORTH AVENUE		X	X			
PS122	SAMUEL COLERIDGE TAYLOR	507 W. PRESTON STREET	X	X		X		
PS124	BAY BROOK	4301 10TH STREET	X			X		
PS125	FURMAN L. TEMPLETON	1200 PENNSYLVANIA AVENUE		X		X		
PS130	BOOKER T. WASHINGTON	1301 MCCULLOCH STREET	X	X	X			
PS133	DUNBAR	500 N. CAROLINE STREET	X			X		
PS134	WALTER P. CARTER	820 E. 43RD STREET		X	X			
PS135	LUTHER CRAVEN MITCHELL	1731 E. CHASE STREET			X			
PS138	HARRIETT TUBMAN	1807 HARLEM AVENUE		X	X			
PS139	CHARLES CARROLL OF CARROLL	200 N. CENTRAL AVENUE	X	X		X		
PS142	ROBERT COLEMAN	2400 WINDSOR AVENUE		X		X		
PS144	JAMES MOSHER	1000 N. WHELLER AVENUE	X	X		X		
PS145	ALEXANDER HAMILTON	800 POPLAR GROVE STREET		X		X		
PS150	BENTALOU	220 N.BENTALOU STREET	X	X	X			
PS157	GEORGE G. KELSON	701 GOLD STREET	X	X		X		
PS159	CHERRY HILL	801 BRIDGEVIEW ROAD	X	X	X	X		
PS160	CARTER GODWIN WOODSON	2501 SEABURY ROAD	X	X		X		
PS161	GEORGE WASHINGTON	1001 W. SARATOGA	X	X				
PS162	DIGGS-JOHNSON	501-503 W. BARRE STREET	X	X	X			
PS163	PATAPSCO	844 ROUNDVIEW ROAD	X	X		X		
PS164	ARUNDEL	2400 ROHND ROAD	X	X		X		
PS175	GEO. BRAGG NATURE CENTER	6601 BALT. NATIONAL PIKE	X			X		
PS177	GEORGE W. F. McMECHEN	4411 GARRISON BOULEVARD				X		
PS178	FRANCIS M. WOOD	100 N. CALHOUN STREET				X		
PS180	CHERRY HILL	2700 SEAMON ROAD	X	X		X		
PS201	DICKEY HILL	5025 DICKEY HILL ROAD	X	X		X		
PS202	LAFAYETTE	850 BRADDISH AVENUE	X	X		X		
PS203	MARCIE GARNETT FARRING	300 PONTIAC AVENUE		X		X		
PS204	MARY RODMAN	3510 W. MULBERRY STREET	X	X		X		
PS205	WOODHOME	7300 MOYER AVENUE	X	X		X		
PS206	FURLEY	4633 FURLEY AVENUE	X	X	X	X		
PS207	CURTIS BAY	4301 WEST BAY AVENUE	X	X		X		
PS209	WINSTON	1101 WINSTON AVENUE	X	X		X		
PS210	HAZELWOOD	4517 HAZELWOOD AVENUE	X	X	X	X		
PS211	GARDEN VILLE	5300 BELAIR ROAD	X	X		X		
PS212	GARRETT HEIGHTS	2800 AILSA AVENUE	X	X		X		
PS213	GOVANS	5801 YORK ROAD	X	X		X		
PS214	GUILFORD #214	4520 YORK ROAD	X	X		X		
PS215	HIGHLANDTOWN	3223 PRATT STREET		X		X		
PS216	FRANKFORD	6001 FRANKFORD AVENUE	X			X		
PS217	BELMONT	1406 N. ELLAMONT STREET	X	X	X	X		
PS219	YORKWOOD	5931 YORKWOOD ROAD	X	X		X		
PS220	MORRELL PARK	2601 TOLLEY STREET		X		X		

BALTIMORE CITY SCHOOL MANAGEMENT PLAN LIST

ASBESTOS-CONTAINING BUILDING MATERIALS (ACBM) INVENTORY BY BUILDING

BULDING NUMBER *	BUILDING NAME	ADDRESS	FRIABLE ACBM	NON-FRIABLE ACBM	ASSUMED FRIABLE ACBM	ASSUMED NON-FRIABLE ACBM	NO ACBM FOUND	NO SUSPECT MATERIAL
PS221	MOUNT WASHINGTON	1801 SULGRAVE AVENUE	X	X	X			
PS222	PIMLICO	3500 W. NORTHERN PARKWAY	X	X		X		
PS222A	PIMLICO	3500 W. NORTHERN PARKWAY		X				
PS223	PIMLICO	4849 PIMLICO ROAD	X	X	X			
PS224	GROVE PARK	5545 KENNISON AVENUE	X	X		X		
PS225	WESTPORT	2401 NEVADA STREET		X		X		
PS226	VIOLETVILLE	1207 PINE HEIGHTS AVENUE	X	X		X		
PS228	JOHN RUHRAH	701 RAPPOLLA STREET	X	X		X		
PS229	HOLABIRD	1500 IMLA STREET	X	X		X		
PS230	CANTON	801 S. HIGHLAND AVENUE	X			X		
PS231	BREHMS LANE	3536 BREHMS LANE	X	X	X			
PS232	THOMAS JEFFERSON	605 DRYDEN DRIVE	X	X		X		
PS233	ROLAND PARK	5207 ROLAND AVENUE	X	X		X		
PS234	ARLINGTON	3705 W. ROGERS AVENUE	X	X	X	X		
PS235	GLENMOUNT	6211 WALTHER AVENUE	X	X		X		
PS236	HAMILTON	6101 OLD HARFORD ROAD	X	X	X	X		
PS237	HIGHLANDTOWN	231 S. EATON STREET	X	X	X	X		
PS238	VICTORY	1440 CHESAPEAKE AVENUE	X	X		X		
PS239	BENJAMIN FRANKLIN	1201 CAMBRIA STREET	X	X				
PS240	GRACELAND PARK-O'DONNELL	6300 O'DONNELL STREET	X	X	X			
PS241	FALLSTAFF	3801 FALLSTAFF ROAD	X	X		X		
PS241A	FALLSTAFF	3801 FALLSTAFF ROAD		X				
PS242	NORTHWOOD	5201 LOCH RAVEN BOULEVARD	X	X	X			
PS242A	NORTHWOOD	5201 LOCH RAVEN BOULEVARD	X	X		X		
PS243	ARMISTEAD GARDENS	5001 E. EAGER STREET	X	X	X			
PS245	LEITH WALK	1235 SHERWOOD AVENUE	X	X	X			
PS245A	LEITH WALK	1235 SHERWOOD AVENUE	X			X		
PS246	BEECHFIELD	301 BEECHFIELD AVENUE	X	X		X		
PS247	CROSS COUNTRY	6100 CROSS COUNTRY BLVD.	X	X		X		
PS248	SINCLAIR LANE	3880 SINCLAIR LANE	X	X		X		
PS249	MEDFIELD HEIGHTS	4300 BUCHANAN AVENUE	X	X	X	X		
PS250	DR. BERNARD HARRIS, SR.	1400 N. CAROLINE STREET	X			X		
PS251	CALLAWAY	3701 FERNHILL AVENUE	X	X				
PS254	DR. MARTIN LUTHER KING, JR.	3750 GREENSPRING AVENUE	X	X		X		
PS255	SOUTHEAST	6820 FAIT AVENUE	X	X		X		
PS256	CALVIN RODWELL	3501 HILLSDALE ROAD		X		X		
PS260	FREDERICK	2501 FREDERICK AVENUE				X		
PS261	LOCKERMAN-BUNDY	301 N. PULASKI STREET		X		X		
PS301	WILLIAM S. BAER ELEMENTARY	2001 WARWICK AVENUE	X	X		X		
PS303	UPTON	811 W. LANVALE	X	X		X		
PS304	HARBOR VIEW ELEMENTARY	4301 10TH AVENUE	X	X	X			
PS307	CLAREMONT ELEMENTARY	5301 ERDMAN AVENUE	X	X		X		
PS310	FERNHILL ELEMENATRY	3915 FERNHILL AVENUE		X		X		
PS313	LOIS T. MURRAY	1600 E. ARLINGTON AVENUE		X		X		
PS314	SHARP-LEADENHALL	150 W. WEST STREET		X		X		

BALTIMORE CITY SCHOOL MANAGEMENT PLAN LIST

ASBESTOS-CONTAINING BUILDING MATERIALS (ACBM) INVENTORY BY BUILDING

BULDING NUMBER *	BUILDING NAME	ADDRESS	FRIABLE ACBM	NON-FRIABLE ACBM	ASSUMED FRIABLE ACBM	ASSUMED NON-FRIABLE ACBM	NO ACBM FOUND	NO SUSPECT MATERIAL
PS315	DR. LILLIE M. JACKSON	1501 ASBURTON STREET		X		X		
PS353A	WOODBURN CENTER	1301 WOODBURN AVE	X	X				
PS400	EDMONDSON	501 N. ATHOL AVENUE	X	X		X		
PS401	NORTHWESTERN	6900 PARK HEIGHTS AVENUE	X	X		X		
PS402	NORTHERN	2201 PINEWOOD AVENUE	X	X		X		
PS403	COB POLYTECH #403	1400 COLDSPRING LANE	X	X		X		
PS405	PATTERSON	100 KANE STREET	X	X		X		
PS406	FOREST PARK	3401 ELDORADO AVENUE		X		X		
PS407	WESTERN	4600 FALLS ROAD	X	X		X		
PS410	MERGENTHALER	3500 HILLEN ROAD	X	X		X		
PS412	SOUTHWESTERN	200 FONTHILL AVENUE	X			X		
PS413	HARBOR CITY LEARNING CTR.	4801 LIBERTY HEIGHTS AVE.	X	X		X		
PS414	PAUL LAURENCE DUNBAR	1400 ORLEANS STREET	X	X		X		
PS415	SCHOOL FOR THE ARTS	706-712 CATHEDRAL STREET	X	X	X	X		
PS420	WEST SIDE SKILLED CENTER	4501 EDMONDSON AVENUE	X	X	X			
PS450	FREDERICK DOUGLAS	2301 GWYNNS FALLS PARKWAY	X			X		
PS451	JOSEPH C. BRESCOE	5506 W. BIDDLE SREET	X	X		X		
PS453	FAIRMOUNT HILL	100 N. ANN STREET	X	X		X		
PS454	CARVER	2201 PRESSTMAN STREET	X	X		X		
PS456	HARFORD INSTITUTE	2555 HARFORD ROAD	X	X		X		
PS457	LAURENCE G. PAQUIN	2200 SINCLAIR LANE		X		X		
PS480	BALTIMORE CITY COLLEGE	3220 THE ALAMEDA	• X	X		X		
PS504	REPAIR SHOP	1230 E. 20th ST.	X	X		X		
PS513	KID'S DINER	SARATOGA & HOLIDAY					X	
PS525	WAREHOUSE	1149 E. GRANBY ST.		X				
PS526	XPORTATION GARAGE & OFFICE	1210 E. 20th ST.	X	X		X		
PS534	ELECTRICAL SHOP	1812 GREENMOUNT AVENUE	X	X				
PS540	SCHOOL HEADQUARTERS	200 E. NORTH AVE.					X	
PS556	GROUNDS SHOP	2614 PENNSYLVANIA AVENUE	X	X				
PS557	OFFICE WAREHOUSE (#557)	2200 ROBB STREET	X	X		X		
PS554	BUS XPORTATION GARAGE&OFF.	1601 BRADDISH AVE.		X		X		
PS564A	BUS XPORTATION GARAGE&OFF.	1601 BRADDISH AVE.		X				
PS701	KIRK AV. STADIUM	KIRK & EXETER HALL AVE.	X					
PS850	PARK HEIGHTS # 1	3941 REISTERTOWN ROAD				X		
PS851	PARK HEIGHTS # 2	2600 KEYWORTH AVENUE	X	X		X		
PS852	PARK HEIGHTS # 3	3901 PARK HEIGHTS AVENUE					X	
WDS001	WALDORF # 1	4901 GREENSPRING AVENUE	X	X		X		
WDS001A	WALDORF # 2	4701 YELLOWWOOD AVENUE	X	X				

* EACH BUILDING NUMBER IN THIS TABLE REPRESENTS A SEPERATE BUILDING FOR WHICH A MANAGEMENT-PLAN WAS PRODUCED. BUILDING NUMBERS ENDING IN "A", "B", etc. REPRESENT AUXILIARY BUILDINGS ON THE SITE OF THE MAIN BUILDING.

PREFACE

The purpose of this asbestos-containing materials (ACM) management plan for this school building is to identify the location, extent, and condition of ACM in the school building(s) and to describe and recommend preventive measures and response actions to be taken to protect human health and the environment from these materials. The plan, prepared for the Board of School Commissioners of Baltimore City, is in accordance with and meets the requirements of the Final Rule for Asbestos-Containing Materials in Schools, 40 CFR Part 763. The complete text of 40 CFR Part 763 is maintained on file at the Department of Education, Headquarters Building, 200 East North Avenue, Baltimore, Maryland. Selected excerpts of Part 763 are included in Appendix B of this plan for informational purposes.

The general requirements for the preparation and submittal of management plans are described in Paragraph 763.93 of the EPA Rule (see Appendix B). This plan is organized into ten sections which specifically address the requirements and generally follow the sequence of EPA's description of the plan contents in Paragraph 763.93 (see Appendix B). The first section provides a general description of the school, ACM inspection results, and the assessment of the problem within the school. The ACM inspection results emphasize places or materials that were found to contain asbestos and not places or materials where no ACM or suspect materials were found. Section 2 describes the qualifications and identifies the person designated by the Baltimore City School Board to ensure that the duties of the Board are carried out in accordance with EPA requirements.

Section 3 of the plan summarizes and provides a quick reference to the recommended preventive measures and response actions, and Section 4 provides a detailed description of the actions, including the methods to be used, reasons for selection, and a discussion of the schedule for beginning and completion of the actions.

The credentials and accreditation of the persons who will design or carry out response actions are provided in Section 5. Section 6 contains a description of the ACM which remains in the school once response actions are completed.

Reinspection plans and the plan for operations and maintenance activities are contained in Section 7. The steps that will be used to inform workers and building occupants about provisions of this management plan are contained in Section 8. Section 9 contains an evaluation of the resources required to implement this management plan and Section 10 identifies the consultant and accreditation information of the contributors to this plan.

Appendix A contains copies of the chain-of-custody forms and laboratory data sheets for the bulk sample data. Selected excerpts from the Final Rule for Asbestos-Containing Materials in Schools, 40 CFR Part 763, are included in Appendix B. Appendix C contains information pertaining to all response actions which have taken place at the school since the original inspection. Appendix D contains the ACM abatement schedule. Appendix E contains a description of required operations and maintenance (O&M) activities for the ACM found in this building. Appendix F contains copies of the AHERA accreditation certificates for the Versar inspection, assessment, and management planning personnel and William A. Gieseking, the Designated LEA Representative. Appendix G contains copies of the October 1988 management plan deferral request and approval in accordance with Public Law 100-368, an amendment to AHERA. Appendix G also contains copies of the notification of management plan availability information. Appendix H contains a schematic building floor plan showing most asbestos bulk sampling locations (certain wallboard, plaster, and floor tile mastic samples are not included; see text in Section 1.2 for locations of these samples).

It is to be understood that because this plan recommends various activities over time, the plan must be a dynamic document that changes as

conditions change and scheduled events occur. Provisions are made for an annual update supplement that will have the same format as this plan. Each of the ten sections will be addressed and updated as appropriate in each supplement. The first annual supplement will be issued in May 1990.

GLOSSARY

ACBM:	"Asbestos-containing building material" (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a school building.
ACM:	"Asbestos-containing material" (ACM) when referring to school buildings means any material or product which contains more than 1 percent asbestos.
AHERA:	Asbestos Hazard Emergency Response Act
Contractor:	A firm hired by the City of Baltimore to conduct asbestos response action activities. It is understood that any such contractor will be licensed by the State of Maryland to conduct asbestos work and that the work will be performed in accordance with the Baltimore City Technical Specifications (on file at the Physical Plant Office of the Baltimore City Department of Education at 200 E. North Avenue) and applicable State and Federal requirements.
Designated LEA Representative:	Individual appointed by Board of School Commissioners to be responsible for ensuring that the general requirements of the Board related to AHERA are met.
EPA:	U.S. Environmental Protection Agency
Flexible Connector:	A heating/cooling ductwork connector that is flexible so as to minimize the transmission of system vibration; also referred to as a "vibration damper".
Friable	"Friable" when referring to material in a school building means that the material, when dry may be crumbled, pulverized, or reduced to powder by hand pressure, and includes previously nonfriable material after such previously nonfriable material becomes damaged to the extent that when dry it may be crumbled, pulverized, or reduced to powder by hand pressure.

LEA:	Local Education Agency
Responsible Person:	Means the same as Designated LEA Representative (see entry in this Glossary for Designated LEA Representative)
Vibration Damper:	A heating/cooling ductwork connector that is flexible so as to minimize the transmission of system vibration; also referred to as a "flexible connector".

Versar INC.

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(Continued)

Versar INC.

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1.0 - SCHOOL DESCRIPTION AND INSPECTION AND ASSESSMENT RESULTS

1.1 General Building Description

Mount Washington Elementary School (PS221) at 1801 Sulgrave Avenue, Baltimore, Maryland 21209, has four floors with a total of approximately 41,446 sq. ft. (see Figure 1-1). The building has a precast reinforced concrete frame, except the multi-purpose room where structural girders are used for roof framing. Exterior walls are generally face brick with slag block backup and precast concrete panels. Interior partitions are generally painted, fine-textured slag block. Floors are vinyl asbestos tile, quarry tile, ceramic tile, or terrazzo. Ceilings are exposed painted concrete plank and acoustical tile.

The building was inspected for asbestos-containing materials (ACM) on February 1, 1988, by Lee Sesler.

The building contains 15 classrooms, a cafeteria and kitchen, a library, a multi-purpose room used as an auditorium and a gymnasium, an office suite, a health suite, storage areas, janitor's closets, a teachers' room and work room, toilets, and a boiler room. The total building population of 381 consists of 355 students, 23 employees, and 3 maintenance and custodial workers.

The building's heating system consists of two oil fired hot water boilers interconnected to univents, radiant tubes and an air handling unit by a hot water supply and return piping system.

Versar INC.

Name	Signature/Date	Accreditation Number
LEE SESLER	Lee Sesler / 4-20-89	IMP-R-011

The personnel listed above participated in the inspection of this building and the collection of suspected ACBM samples. Each is accredited by an EPA-approved AHERA inspector's course developed under Section 206(c) of Title II of the Toxic Substances Control Act (TSCA). Copies of the accreditation and/or reaccreditation certificate (provides course name, place, and date; the accreditation number; and the name of the organization providing the course) for each accredited inspector are provided in Appendix F.

The following persons collected ACBM samples prior to promulgation of AHERA and were not accredited at that time. The samples were collected in support of litigation between Baltimore City and the manufacturers and suppliers of asbestos-containing materials. These samples were not collected as a result of any complaints from the building occupants or visitors.

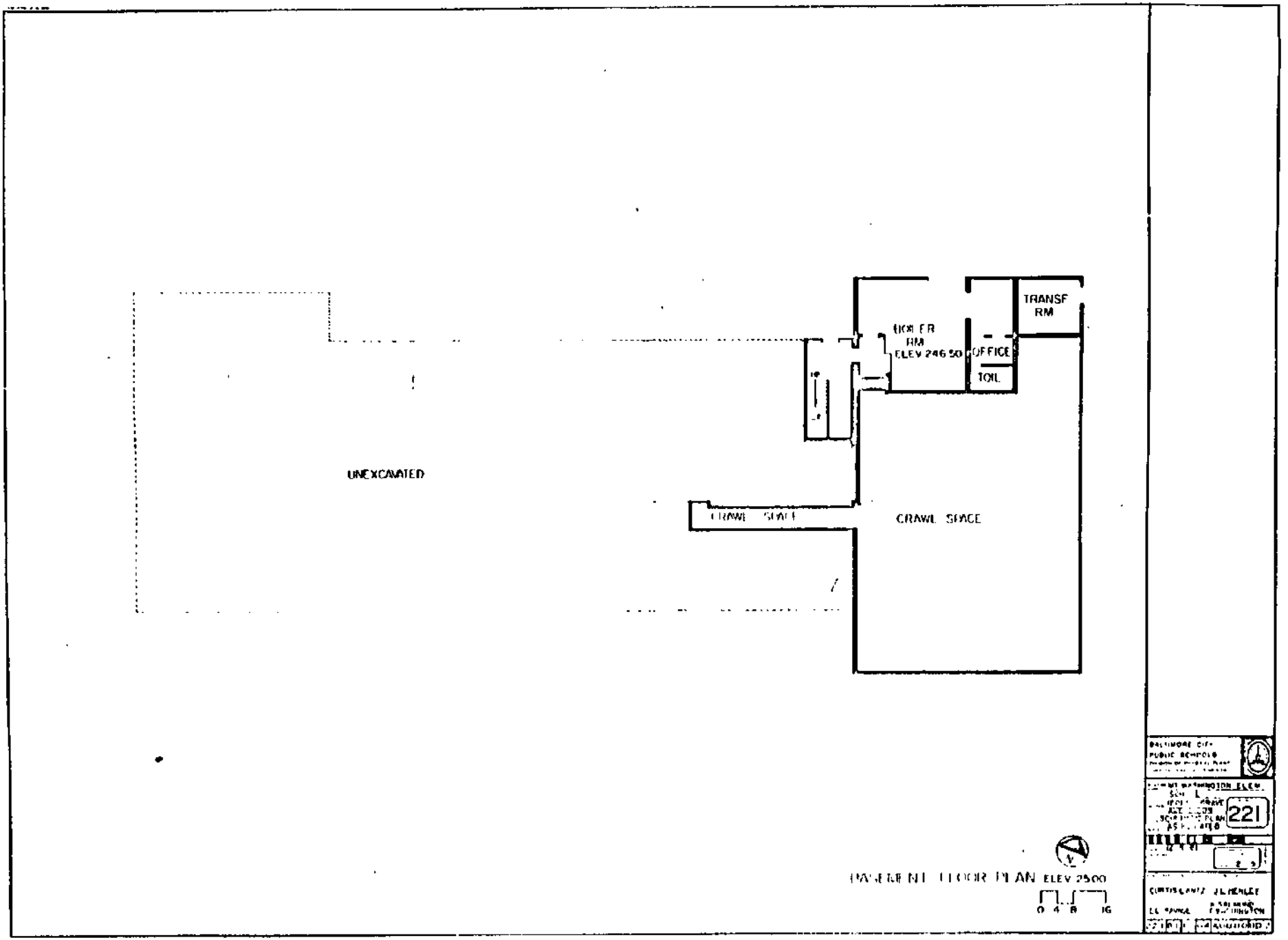
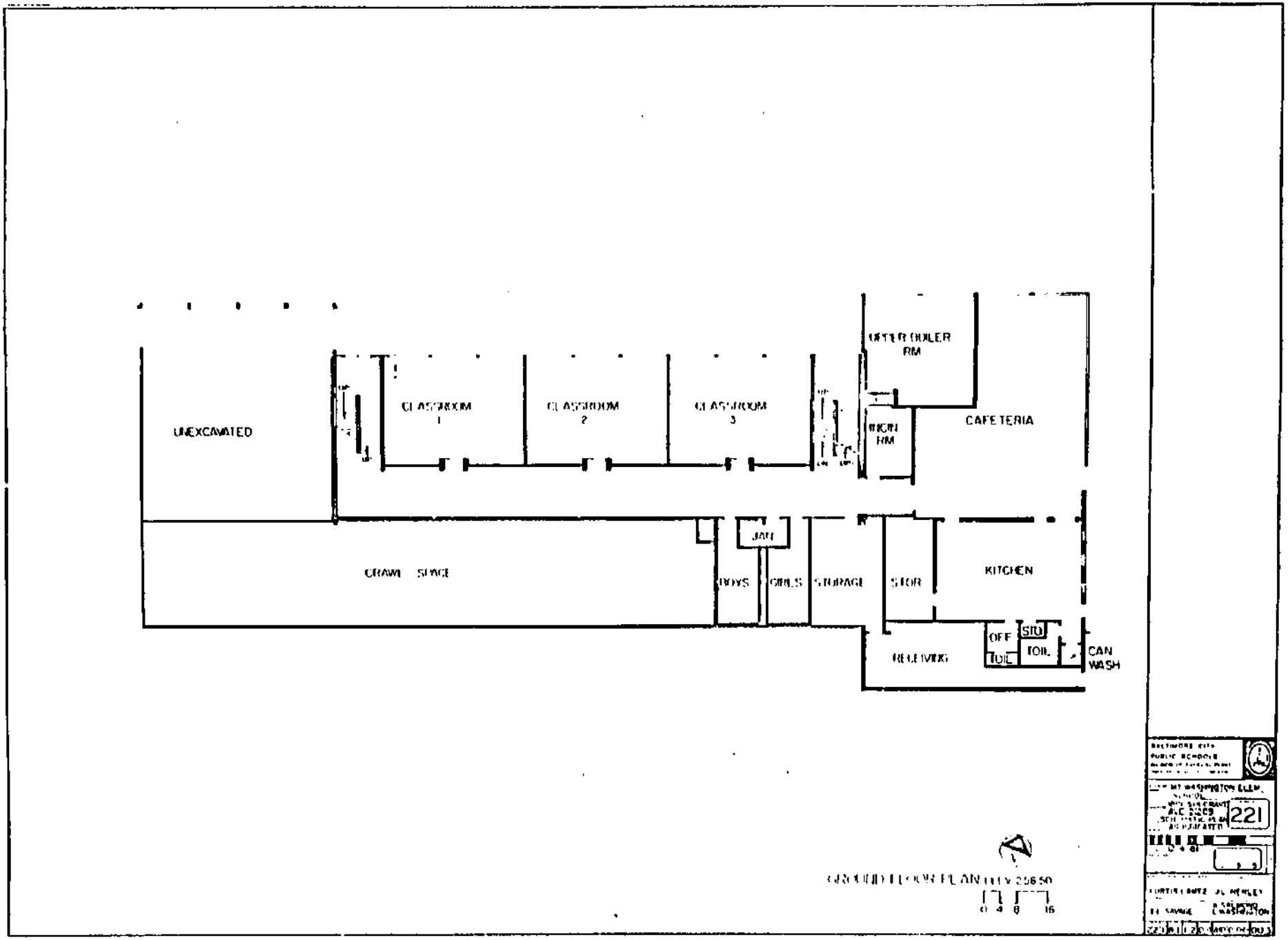

UNEXCAVATED
BOILER RM ELEV 246.50
OFFICE
TOIL
TRANSF RM
CRAWL SPACE
CRAWL SPACE
BASEMENT FLOOR PLAN ELEV 250.0
0 4 8 16
BALTIMORE CITY PUBLIC SCHOOLS
221

Figure 1-1



Mount Washington Elementary School PS221
(0723k-Rev A)

Figure 1-1

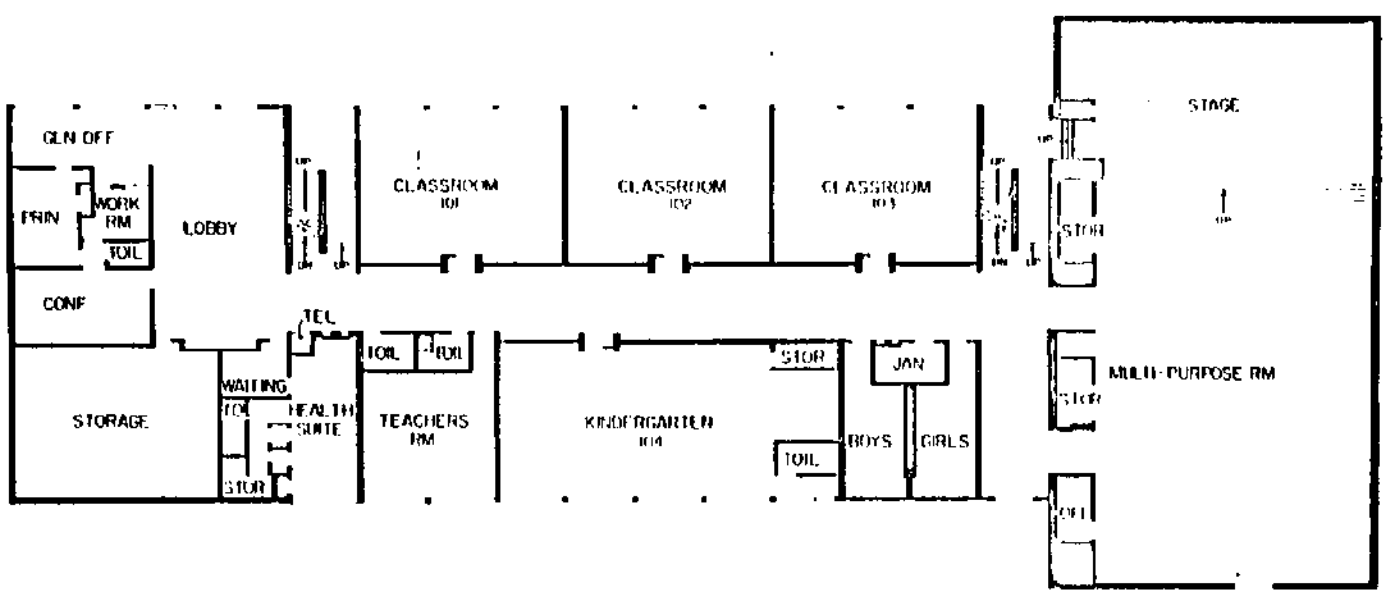
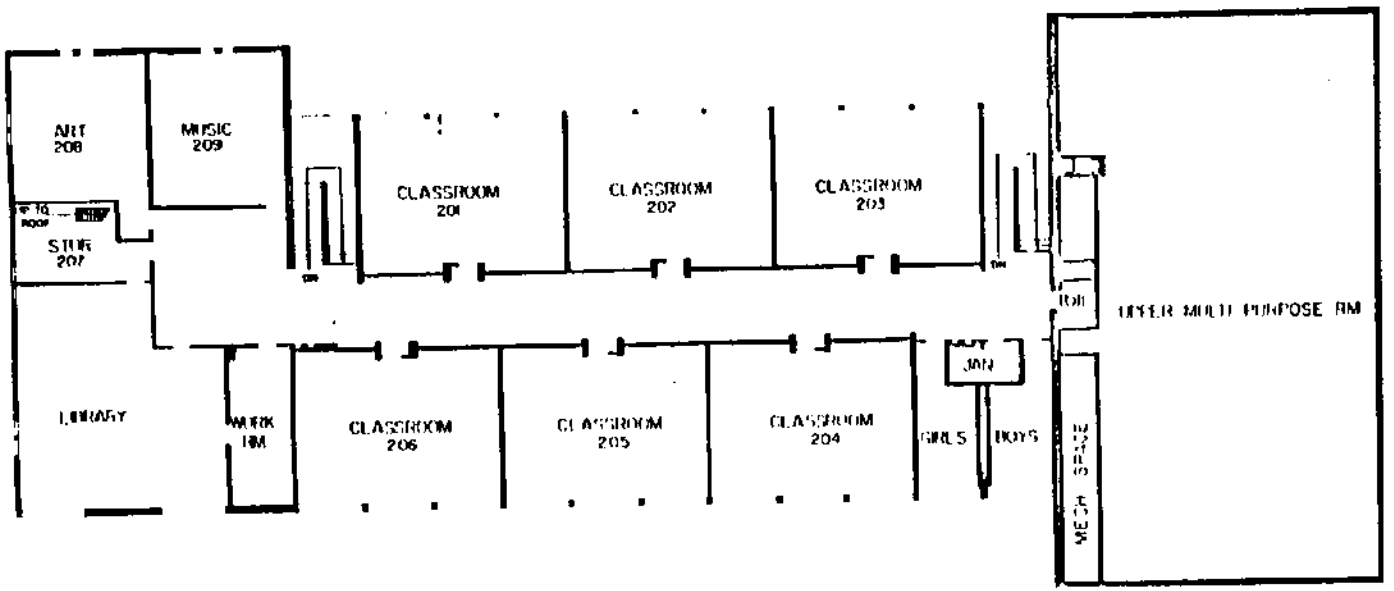

GLN OFF
PRIN
WORK RM
TOIL
LOBBY
CONF
STORAGE
CLASSROOM 101
CLASSROOM 102
CLASSROOM 103
STAGE
STOR
TEL
TOIL
TOIL
WAITING
TOIL
HEALTH SUITE
STOR
TEACHERS RM
KINDERGARTEN 104
STOR
JAN
BOYS
GIRLS
TOIL
MULTI-PURPOSE RM
STOR
OFF

Figure 1-1



Mount Washington Elementary School PS221
(0723k-Rev A)

Figure 1-1

1.2 Inspection and Sampling Results

All samples were collected in accordance with EPA sampling protocol (see Appendix B; Paragraph 763.86, Final Rule) by the inspector. According to the rule, only one sample from a suspect material homogeneous area needs to test positive (i.e., one percent or greater asbestos fiber) for the entire homogeneous area to be declared an ACM. Therefore, in many instances of suspect materials testing positive, the number of samples taken and/or analyzed is less than the number of samples required by EPA protocol to prove that a material is a non-ACM. In cases where a suspect material is declared a non-ACM, the samples were taken as follows:

a. For surfacing materials, samples were taken in a statistically random manner from the homogeneous area. For areas 1,000 sq. ft., or less, at least three samples were taken. For areas greater than 1,000 sq. ft. but less than or equal to 5,000 sq. ft., at least five samples were taken. For areas greater than 5,000 sq. ft., at least seven samples were taken.

b. For Thermal Systems Insulation, at least three samples were collected in a randomly distributed manner from a homogeneous area.

c. For miscellaneous materials, the samples were taken in a manner sufficient to determine whether the material was ACM or not ACM.

The samples were analyzed by the Versar, Inc., asbestos laboratory at 6850 Versar Center, Springfield, Virginia 22151. The Versar laboratory has been and is accredited by the appropriate EPA accreditation mechanism for the full duration of sampling and analysis activities associated with the development of this management plan. The Versar laboratory is currently accredited for bulk asbestos analysis by polarized light microscopy under the National Voluntary Laboratory Accreditation Program (NVLAP). The laboratory accreditation information and the bulk analysis laboratory data sheets are contained in Appendix A.

The following inspection information includes rough on-site estimates of ACM quantities (contained in the text and summarized in Table 1-A) which do not have a high degree of accuracy. The estimates provided in subsequent sections may differ from the field estimates for the same material because they were derived (for abatement cost estimates) from actual building drawings and are more accurate.

The floor tile mastic associated with floor tile determined to be an ACM is assumed to also be an ACM, and whatever assessment and response actions apply to the tile apply to the mastic as well. In some cases, the mastic associated with floor tile determined to be non-ACM is assumed to be ACM and in others it was sampled. It is stated in the following text whether the mastic is assumed to be ACM, or whether the mastic was sampled.

Asbestos bulk sampling locations are described in the following text. To augment this information, Appendix H contains a schematic building floor plan showing most sampling locations (certain wallboard, plaster, and floor tile mastic samples are not included; these locations are described in the text).

1.2.1 Ceilings and Walls

Sprayed-on

This material was not observed in the building.

Tile

Samples were taken from both sizes of fissured ceiling tile in the building. Samples PS221-002-007-LS, PS221-002-008-LS, and PS221-002-009-LS from 2- by 4-ft. tile in the cafeteria and PS221-003-002-LS from the multipurpose room, PS221-003-003-LS from the hall near the multipurpose room, and PS221-004-001-LS from the staff toilet near room 203 from 1- by 1-ft. tile contain <1% asbestos. The 2- by 4-ft. tile covers approximately 1,932 sq. ft. while the 1- by 1-ft. tile covers approximately 3,501 sq. ft.

Acoustical Plaster

This material was not observed in the building.

Other Plaster

This material was not observed in the building.

Wallboard

This material was not observed in the building.

1.2.2 Floor Coverings

Samples were taken from both gray and creme floor tiles in the building. All samples contain 1-5% chrysotile. These tiles cover approximately 30,000 sq. ft. Samples PS221-002-005-LS from Room 2, PS221-004-002-LS from the hall near Room 204, and PS221-004-003-LS from Room 206 were from the gray tile. Samples PS221-002-006-LS from the hall near the incinerator room, PS221-003-001-LS from the health suite, and PS221-003-004-LS from the teacher's room were from the creme tile.

1.2.3 Mechanical

Pipe

Sample PS221-001-008-LS was collected from preformed magnesia pipe insulation on a heating supply pipe in the boiler room and was found to contain 15-20% amosite. This material was in good condition in the boiler room, and it is typical of all heating supply and return pipe insulation throughout the building. Cold water, hot water, hot water return and rainleader piping was insulated with fiber glass. The oil piping in the boiler room was uninsulated.

Sample PS221-002-003-LS was collected from debris in the crawl space which had delaminated from the heating pipes in the west end of the crawl space, and it was found to contain 15-20% chrysotile and 15-20% amosite. This area is very damp, causing all pipe and fitting insulation in the west end of the crawl space to delaminate, leaving extensive debris from both pipe and fitting insulation in the dirt. A limited amount of

preformed pipe insulation in the pipe trench at the east end of the crawl space has also delaminated. Pipe insulation outside the crawl space was generally in good condition, because some sections are protected by metal pipe shields. This material covers approximately 2,610 ft. of heating system piping throughout the building.

Chases

Sample PS221-002-003-LS was collected from debris in the crawl space, as discussed above, and it was found to contain 15-20% chrysotile and 15-20% amosite. Samples were also collected from fitting insulation in the crawl space, and these will be addressed in the following section.

Elbows and Fittings

Table 1-1 outlines the samples from trowelled-on fitting insulation in the building. All trowelled-on fitting insulation should be considered to contain asbestos. Fittings in the west end of the crawl space have sustained significant damage due to delamination. Other fittings in the building were generally in good condition. Approximately half of the rainleader fittings are insulated with a trowelled-on material similar to fitting insulation from which samples were collected. All fittings in the crawl space lacked a textile jacket, while those outside the crawl space were wrapped with textile. However, cold water fittings in the crawl space were coated with tar. This material covers approximately 1,410 sq. ft.

Boilers and Breeching

The two boilers had no exterior insulation. Sample PS221-001-003-LS from the boiler breeching trowelled-on insulation contains 50-55% chrysotile. Sample PS221-001-004-LS from the boiler breeching block insulation contains 15-20% chrysotile and 30-35% amosite. These materials cover approximately 400 sq. ft. and have sustained moderate damage from water, impact, and cracking of the outer layer.

TABLE 1-1 ELBOW AND FITTING SAMPLES IN BUILDING PS221

Sample	Asbestos Content	Description	Sample Location
PS221-001-005-LS	<1%	Hot water elbow	Boiler Room
PS221-001-006-LS	1-5% Chrysotile	Cold water elbow	Boiler Room
PS221-001-007-LS	1-5% Chrysotile	Heat. supply elbow	Boiler Room
PS221-002-001-LS	<1%	Heating tee	Crawl Space
PS221-002-002-LS	<1%	Cold water elbow	Crawl Space
PS221-002-004-LS	1-5% Chrysotile	Heating elbow	Crawl Space

Tanks

Sample PS221-001-001-LS from the trowelled-on layer of the hot water generator in the boiler room contains 35-40% chrysotile. Sample PS221-001-002-LS from the block insulation on the hot water generator contains 30-35% chrysotile and 1-5% amosite. These materials cover approximately 100 sq. ft. and have sustained moderate damage due to impact and cracking of the outer surface.

The two expansion tanks in the boiler room were uninsulated. The water heater in the boiler room had no exterior insulation.

Ductwork

Ductwork in the building was either insulated with fiber glass or was uninsulated. Flexible connectors were made of neoprene.

1.2.4 Other

Asbestos cement boards were not observed in the building. Fire doors carried the Underwriter's Label. Damaged doors were not observed and as such, samples were not collected. The six fire doors will be assumed to contain asbestos and cover approximately 126 sq. ft. The stage curtain was composed of vinyl. Sample PS221-001-009-LS from an unmarked bag of cement in the transformer room contains <1% asbestos. This material covers approximately 4 sq. ft. This material covers approximately 4 sq. ft.

TABLE 1-A
ACM QUANTITIES BY APPLICATION

FOR PS 221

ACM APPLICATION	QUANTITY SQUARE FEET	QUANTITY LINEAR FEET
CEILINGS & WALLS		
SPRAYED-ON		
TILE		
ACOUSTIC PLASTER		
OTHER PLASTER		
WALLBOARD		
FLOOR COVERINGS	30,000	
MECHANICAL		
PIPE		2,610
ELBOWS & FITTINGS	1,410	
BOILERS & BREECHING	400	
TANKS	100	
DUCTWORK		
OTHER (GASKETS, FLEXIBLE CONNECTORS, ETC)		
OTHER		
CURTAINS		
FIREDOORS	126	
CEMENT BOARD		

NOTE: FOR LOCATIONS OF ACBM APPLICATIONS, SEE THE PRECEDING TEXT IN THIS SECTION (1.2) AND APPENDIX H.

1.3 Assessment of ACM

1.3.1 Assessment by Functional Space

The ACM in this school building is located in functional spaces.

> A "functional space" means a room, group of rooms, or homogeneous area (including crawl spaces or the space between a dropped ceiling and the floor or roof deck above), such as classroom(s), a cafeteria, gymnasium, hallway(s), designated by a person accredited to prepare management plans, design abatement projects, or conduct response management actions." (40 CFR Part 763.83 Definitions).

For assessment purposes, a functional space shall be defined as any space within a building which is designated and/or utilized by the building occupants for like purposes and which contains ACM. A functional space is not necessarily a space or area which is occupied (i.e., a functional space could be a steam tunnel, enclosed pipe chase, or return air plenum separate and distinct from any adjacent or surrounding functional space(s)). Additionally, a functional space is not necessarily a spatially or functionally contiguous area or space. Generally, however, a functional space shall be limited to areas within a building which are used for a specific function and which contain the same kind(s) of asbestos in the same condition.

The above definition is for guidance only; the management planner is the person finally responsible as designated by AHERA to determine the spatial extent of a particular functional space in the management plan.

1.3.2 Assessment by Damage and Potential Damage Factors

The ACM within a functional space is characterized by both the damage factor and the potential damage factor. The damage factor reflects the current condition of the ACM. There are three damage classifications: (1) significant damage, (2) damage, and (3) little or no damage (i.e., good condition). Likewise, there are three potential damage classifications: (1) potential for significant damage, (2) potential for damage, and (3) little or no potential for damage.

Significant Damage

Thermal System Insulation (TSI) with "significant damage" is defined as ACM with one or more of the following characteristics:

- The material has no protective covering or the protective covering is damaged or missing over one-half of the surface area.
- The material has sustained extensive overall damage (it is crushed, heavily gouged, and/or punctured) on one-tenth or more of its overall surface.
- The material has sustained extensive damage (it is crushed, heavily gouged, and/or punctured) on one-quarter or more of a localized area of its surface.

Surfacing/Miscellaneous Material with significant damage is defined as ACM with one or more of the following characteristics:

- The material is crumbled, spalled, blistered, or delaminated over one-tenth or more of its overall surface.
- The material is crumbled, spalled, blistered, or delaminated over one-quarter of a localized area of its surface.
- The material has water stains, gouges, or is marred over at least one-tenth of its overall surface.
- The material has water stains, gouges, or is marred over at least one-quarter of a localized area of its surface.

Damage

TSI with "damage" is defined as ACM with one or more of the following characteristics:

- The material's protective covering has been damaged or removed over one-tenth to one-half of its surface.
- The subject ACM is crushed, water-stained, gouged, punctured, or marred over one-tenth or less of its overall surface.
- The subject ACM is water-stained, gouged, punctured, or marred over one-quarter or less of a localized area of its surface.

Surfacing or miscellaneous ACM with "damage" is defined as material with one or more of the following characteristics:

- The ACM is crumbled, blistered, water-stained, gouged, marred, or abraded over less than one-tenth of the overall surface.
- The ACM is crumbled, blistered, water-stained, gouged, marred, or abraded over less than one-quarter of a localized area of its surface.

Little or No Damage

"Little or No Damage" is defined as either TSI or Surfacing/ Miscellaneous Material which has no visible damage or deterioration or very limited damage or deterioration.

AHERA requires that all friable ACM and suspect ACM be assessed and placed into one of seven categories. The City of Baltimore Designated LEA Representative has added an eighth category to include "any remaining nonfriable ACM or nonfriable suspected ACM." These eight categories are:

AHERA

1 Damaged or significantly damaged thermal system insulation ACM.

2 Damaged friable surfacing ACM.

3 Significantly damaged friable surfacing ACM.

4 Damaged or significantly damaged friable miscellaneous ACM.

5 ACBM with potential for damage.

6 ACBM with potential for significant damage.

7 Any remaining friable ACBM or friable suspected ACBM.

8 Any remaining nonfriable ACM or nonfriable suspected ACM.

To assist in the assessment of AHERA categories for ACM in each functional space, decision trees, shown in Figures 4-1 and 4-2 in Section 4.2, were used.

1.3.3 Description of Functional Spaces

The 13 functional spaces in PS221 are:

(1) Boiler room;
(2) Crawl space;
(3) Above suspended ceilings and in pipe chase;
(4) Cafeteria;
(5) Incinerator room;
(6) Hallways and stairwells;
(7) Storage areas;
(8) Classrooms;
(9) Multi-purpose room and stage;
(10) Toilets;
(11) Janitor's Closets;
(12) Offices, health suite, and teachers' lounge; and
(13) Library.

The inspection results of the ACM in the above functional spaces are presented in Section 1.2. The analytical documentation of the samples collected in PS221 is contained in Appendix A.

Functional Space No. 01 - Boiler Room

The ACM identified in the boiler room consists of boiler breeching block and trowelled-on insulation, hot water generator block and trowelled-on insulation, heating system preformed pipe insulation, heating system trowelled-on fitting and valve insulation, and domestic water system trowelled-on fitting and valve insulation. The fire door in the boiler room will be assumed to contain asbestos for the purposes of the management plan.

Boiler Breeching Insulation

Both boiler breechings are insulated with a combination of asbestos-containing block and trowelled-on insulation. These friable materials cover approximately 135 square feet. A small section of these materials appears to have been removed in order to make repairs to the breeching. These materials have sustained damage due to the fact that the trowelled-on layer has delaminated. The material has also sustained cracks and isolated impact damage. This material has little or no potential for damage and is in AHERA category 1.

Hot Water Generator Insulation

The hot water generator is insulated with a combination of asbestos-containing block and trowelled-on insulation. These friable materials cover approximately 137 square feet. These materials have sustained damage due to distributed impact damage, cracking, and delamination of the trowelled-on layer. This material has little or no potential for damage and is in AHERA category 1.

Heating System Pipe Insulation

The heating system piping in the boiler room is insulated with asbestos-containing preformed magnesia pipe insulation. This friable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 7.

Heating System Fitting and Valve Insulation

The heating system fittings and valves in the boiler room are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 7.

Domestic Water Fitting and Valve Insulation

The domestic water fittings and valves in the boiler room are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 7.

Fire Door

The fire door in the boiler room will be assumed to contain asbestos for the purposes of the management plan. This material has sustained little or no damage, has a potential for damage, and is in AHERA category 8.

Functional Space No. 02 - Crawl Space

The ACM identified in the crawl space consists of heating system preformed pipe insulation, heating system fitting trowelled-on insulation, and domestic water fitting trowelled-on insulation.

Heating System Pipe Insulation

The heating system piping in the crawl space is insulated with asbestos-containing preformed magnesia pipe insulation. This friable material has sustained significant damage due to delamination, has a potential for damage, and is in AHERA category 1.

Heating System Fitting Insulation

The heating system fittings in the crawl space are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained significant damage due to delamination, has a potential for damage, and is in AHERA category 1.

Domestic Water Fitting Insulation

The domestic water fittings in the crawl space are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained significant damage due to delamination, has a potential for damage, and is in AHERA category 1.

Functional Space No. 03 - Above Suspended Ceilings and Pipe Chases

The ACM identified above suspended ceilings and in pipe chases consists of heating system preformed pipe insulation, heating system fitting trowelled-on insulation, and domestic water fitting trowelled-on insulation.

Heating System Pipe Insulation

The heating system piping above suspended ceilings and in pipe chases is insulated with asbestos-containing preformed magnesia pipe insulation. This friable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 7.

Heating System Fitting Insulation

The heating system fittings above suspended ceilings and in pipe chases are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 7.

Domestic Water Fitting Insulation

The domestic water fittings above suspended ceilings and in pipe chases are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 7.

Functional Space No. 04 - Cafeteria

The ACM identified in the cafeteria consists of vinyl asbestos tile. Fire doors between the cafeteria and kitchen will be assumed to contain asbestos for the purposes of the management plan.

Vinyl Asbestos Tile

The floor tile in the cafeteria contains asbestos. This nonfriable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 8.

Fire Doors

The two fire doors between the cafeteria and kitchen will be assumed to contain asbestos for the purposes of the management plan. This material has sustained little or no damage, has a potential for damage, and is in AHERA category 8.

Functional Space No. 05 - Incinerator Room

The ACM identified in the incinerator room consists of domestic water fitting trowelled-on insulation. The fire door in the incinerator room will be assumed to contain asbestos for the purposes of the management plan.

Domestic Water Fitting Insulation

The domestic water fittings in the boiler room are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained damage due to impact, has a potential for damage, and is in AHERA category 1.

Fire Door

The fire door in the incinerator room will be assumed to contain asbestos for the purposes of the management plan. This material has sustained little or no damage, has a potential for damage, and is in AHERA category 8.

Functional Space No. 06 - Hallways and Stairwells

The ACM identified in the hallways and stairwells consists of heating system preformed pipe insulation, heating system trowelled-on fitting insulation, and vinyl asbestos tile.

Heating System Preformed Pipe Insulation

The heating system piping in the stairwell near the boiler room and the stairwell near the main office is insulated with asbestos-containing preformed magnesia pipe insulation. This friable material is protected near the floor with a metal pipe covering, has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Heating System Fitting Insulation

The heating system fittings in hallways and stairwells are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Vinyl Asbestos Tile

The floor tile in the hallways contains asbestos. This nonfriable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 8.

Functional Space No. 07 - Storage Areas

The ACM identified in the storage areas consists of heating system preformed pipe insulation, heating system trowelled-on fitting insulation, and domestic water trowelled-on fitting insulation.

Heating System Pipe Insulation

The heating system piping in both the book storage and general storage areas is insulated with asbestos-containing preformed magnesia pipe insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Heating System Fitting Insulation

The heating system fittings in both the book storage and general storage areas are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Domestic Water Fitting Insulation

The domestic water fittings in both the book storage and general storage areas are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Functional Space No. 08 - Classrooms

The ACM identified in the classrooms consists of heating system preformed pipe insulation, heating system trowelled-on fitting insulation, and vinyl asbestos tile.

Heating System Pipe Insulation

A portion of the heating system piping in classrooms 1, 3, 101, 104, 201, and 206 is insulated with asbestos-containing preformed magnesia pipe insulation. The piping near the floor is enclosed with metal pipe jackets while that near the ceiling is exposed. A portion or all of the heating system piping in rooms 103, 201, and 206 are insulated with fiberglass,

but it is difficult to characterize that insulation enclosed by the metal jacket. For this reason, the concealed insulation will be assumed to contain asbestos until the character of the insulation is established. This material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Heating System Fitting Insulation

The heating system fittings in classrooms 1, 3, 101, 104, 201, and 206 are insulated with asbestos-containing trowelled-on insulation. In most cases, the fittings are partially protected by metal enclosures. In all cases, this material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Vinyl Asbestos Tile

The floor tile in the classrooms contains asbestos. This nonfriable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 8.

Functional Space No. 09 - Multi-Purpose Room and Stage

The ACM identified in the multi-purpose room and stage consists of heating system preformed pipe insulation, heating system trowelled-on fitting insulation, roof drain trowelled-on fitting insulation, and vinyl asbestos tile. Fire doors on the stage will be assumed to contain asbestos for the purposes of the management plan.

Heating System Pipe Insulation

The heating system piping on the stage is insulated with asbestos-containing preformed magnesia pipe insulation. A section of this friable material is missing and the ends of the exposed material has been taped. This material has sustained damage, has a potential for damage, and is in AHERA category 1.

Heating System Fitting Insulation

The heating system fittings on the stage are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Roof Drain Fitting Insulation

The roof drain fittings in the multi-purpose room are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 7.

Vinyl Asbestos Tile

The floor tile in the multi-purpose room contains asbestos. This nonfriable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 8.

Fire Doors

The two fire doors on the stage will be assumed to contain asbestos for the purposes of the management plan. This material has sustained little or no damage, has a potential for damage, and is in AHERA category 8.

Functional Space No. 10 - Toilets

The ACM identified in the staff and student toilets consists of heating system preformed pipe insulation, heating system trowelled-on fitting insulation, domestic water trowelled-on fitting insulation, domestic water trowelled-on fitting insulation, and roof drain trowelled-on fitting insulation.

Heating System Pipe Insulation

The heating system piping in both the staff and student toilets is insulated with asbestos-containing preformed magnesia pipe insulation. This material is protected by metal enclosures near the floor in student

toilets while it is exposed near the ceiling of student toilets and in staff toilets. This material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Heating System Fitting Insulation

The heating system fittings in the staff and student toilets are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Domestic Water Fitting Insulation

The domestic water fittings in the staff and student toilets are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Roof Drain Fitting Insulation

The roof drain fittings in the staff and student toilets are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Functional Space No. 11 - Janitor's Closet

The ACM identified in the janitor's closets consists of domestic water fitting insulation. This friable trowelled-on material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Functional Space No. 12 - Offices, Health Suite, and Lounge

The ACM identified in the main office suite, the health suite, the gymnasium office, and the teachers' lounge consists of heating system preformed pipe insulation, heating system trowelled-on fitting insulation, domestic water trowelled-on fitting insulation, and vinyl asbestos tile.

Heating System Pipe Insulation

The heating system pipe insulation in the health suite and the gymnasium office is insulated with asbestos-containing preformed magnesia pipe insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Heating System Fitting Insulation

The heating system fittings in the health suite and the gymnasium office are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Domestic Water Fitting Insulation

The domestic water fittings in the main office suite and the health suite are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Vinyl Asbestos Tile

The floor tile in the main office suite, the health suite, the teachers' lounge, and the gymnasium office contains asbestos. This nonfriable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 8.

Functional Space No. 13 - Library

The ACM identified in the library consists of vinyl asbestos tile. This nonfriable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 8.

1.3.4 Summary of AHERA Assessment

As previously stated in Section 1.3.2, AHERA categories 1 through 7 pertain to friable ACBM. Category 8 is for nonfriable ACBM, and was created for the convenience of Baltimore City for periodic surveillance purposes. The following Table 1-2 summarizes the ACM in PS221.

TABLE 1-2 ASSESSMENT SUMMARY FOR PS221

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	TYPE	CURRENT DAMAGE	POTENTIAL DAMAGE	AHERA CATEGORY
01- Boiler Room	Boiler breeching block and trowelled-on insulation	TSI	Damage	Little or No	1
	Hot water generator block and trowelled-on insulation	TSI	Damage	Little or No	1
	Heating system preformed pipe insulation	TSI	Little or No	Little or No	7
	Heating system fitting and valve trowelled-on insulation	TSI	Little or No	Little or No	7
	Domestic water fitting and valve trowelled-on insulation	TSI	Little or No	Little or No	7
	Fire door	MISC	Little or No	Damage	8
02- Crawl Space	Heating system preformed pipe insulation	TSI	Sig. Damage	Damage	1
	Heating system fitting trowelled-on insulation	TSI	Sig. Damage	Damage	1
	Domestic water fitting trowelled-on insulation	TSI	Sig. Damage	Damage	1
03- Above Suspended Ceilings and in Pipe Chases	Heating system preformed pipe insulation	TSI	Little or No	Little or No	7
	Heating system fitting trowelled-on insulation	TSI	Little or No	Little or No	7
	Domestic water fitting trowelled-on insulation	TSI	Little or No	Little or No	7
04- Cafeteria	Vinyl asbestos tile	MISC	Little or No	Little or No	8
	Fire doors (2)	MISC	Little or No	Damage	8

Mount Washington Elementary School PS221
(0840k)

TABLE 1-2 ASSESSMENT SUMMARY FOR PS221

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	TYPE	CURRENT DAMAGE	POTENTIAL DAMAGE	AHERA CATEGORY
05- Incinerator Room	Domestic water fitting trowelled-on insulation	TSI	Damage	Damage	1
	Fire door	MISC	Little or No	Damage	8
06- Hallways and Stairwells	Heating system preformed pipe insulation	TSI	Little or No	Damage	5
	Heating system fitting trowelled-on insulation	TSI	Little or No	Damage	5
	Vinyl asbestos tile	MISC	Little or No	Little or No	8
07- Storage Areas	Heating system preformed pipe insulation	TSI	Little or No	Damage	5
	Heating system fitting trowelled-on insulation	TSI	Little or No	Damage	5
	Domestic water fitting trowelled-on insulation	TSI	Little or No	Damage	5
08- Classrooms	Heating system preformed pipe insulation	TSI	Little or No	Damage	5
	Heating system fitting trowelled-on insulation	TSI	Little or No	Damage	5
	Vinyl asbestos tile	MISC	Little or No	Little or No	8
09- Multi-Purpose Room and Stage	Heating system preformed pipe insulation	TSI	Damage	Damage	1
	Heating system fitting trowelled-on insulation	TSI	Little or No	Damage	5
	Roof drain fitting trowelled-on insulation	TSI	Little or No	Little or No	7
	Vinyl asbestos tile	MISC	Little or No	Little or No	8

Mount Washington Elementary School PS221
(0840k)

TABLE 1-2 ASSESSMENT SUMMARY FOR PS221

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	TYPE	CURRENT DAMAGE	POTENTIAL DAMAGE	AHERA CATEGORY
	Fire doors (2)	MISC	Little or No	Damage	8
10- Toilets	Heating system preformed pipe insulation	TSI	Little or No	Damage	5
	Heating system fitting trowelled-on insulation	TSI	Little or No	Damage	5
	Domestic water fitting trowelled-on insulation	TSI	Little or No	Damage	5
	Roof drain fitting trowelled-on insulation	TSI	Little or No	Damage	5
11- Janitor's Closet	Domestic water fitting trowelled-on insulation	TSI	Little or No	Damage	5
12- Offices, Health Suite, and Lounge	Heating system preformed pipe insulation	TSI	Little or No	Damage	5
	Heating system fitting trowelled-on insulation	TSI	Little or No	Damage	5
	Domestic water fitting trowelled-on insulation	TSI	Little or No	Damage	5
	Vinyl asbestos tile	MISC	Little or No	Little or No	8
13- Library	Vinyl asbestos tile	MISC	Little or No	Little or No	8

Mount Washington Elementary School PS221
(0840k)

2.0 - DESIGNATED LEA REPRESENTATIVE

The Board of School Commissioners of Baltimore City has designated Mr. William A. Gieseking as the individual responsible for ensuring that the general requirements of the Board are met. Mr. Gieseking's official title is the Designated LEA Representative; his address is:

Mr. William A. Gieseking
Designated LEA Representative
Division of Physical Plant
200 East North Avenue, Room 407
Baltimore, MD 21202
Tele: (301) 396-8672

Mr. Gieseking has attended EPA-approved training courses developed under Section 206(c) of Title II of the Toxic Substances Control Act (TSCA). Copies of his accreditation/reaccreditation certificates are provided in Appendix F. Mr. Gieseking's accreditations related to ACM are: (1) Designing the Abatement Project; (2) Inspection; (3) Management Planning; (4) Abatement Supervisor/Competent Person; (5) Clearance Testing for Asbestos: AHERA Requirements; and (6) Operations and Maintenance Planning.

As the Designated LEA Representative, Mr. Gieseking is responsible for ensuring that the correct procedures are followed for inspection, management plan development and submission, and implementation of response actions. In addition, AHERA requires that the designated representative oversee the following actions:

- Conducting the reinspections and periodic surveillance;
- Informing workers and building occupants, or their legal guardians, at least once each school year about inspection, response actions, and post-response activities;
- Proper training of all maintenance and custodial employees;
- Providing information to short-term workers who may come in contact with asbestos in a school, regarding the locations of ACM;
- Posting warning labels as needed; and
- Ensuring that management plans are available for inspection and proper notification of management plan availability has been given.

3.0 - SYNOPSIS OF APPLICABLE RESPONSE ACTIONS AND/OR PREVENTIVE MEASURES

Table 3-1 summarizes the general response actions and/or preventive measures which must be undertaken to reduce the possibility of a release of asbestos fibers in the school. These general response actions and/or preventive measures are contained in AHERA (40 CFR Part 763) Section 763.90 (see Appendix B). The Baltimore City, Department of Education shall select and implement the response action(s) and/or preventive measure(s) which shall be sufficient to protect the health of the school occupants and overall school environment. The Board may select the least burdensome method to protect health and the environment.

The bases for the specific recommendations regarding each asbestos application are contained in Section 4.0 of the management plan.

The following person developed this management plan, which involved reviewing the inspection information, performing a site visit, preparing the ACM assessment (presented in Section 1.3.3), and recommending preventive measures and response actions. This person is accredited by an EPA-approved AHERA management planner's course developed under Section 206(c) of Title II of the Toxic Substances Control Act (TSCA). Copies of the accreditation/reaccreditation certificate (provides course name, place, and date; accreditation/reaccreditation number; and the name of the organization providing the course) for the management planner are provided in Appendix F.

Name	Signature/Date	Accreditation Number
LEE SESLER	Lee Sesler 4-20-89	IMP-R-011

TABLE 3-1. ACM RESPONSE ACTIONS

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	AHERA CATEGORY	RESPONSE ACTION SUMMARIES
01- Boiler Room	Boiler breeching block and trowelled-on insulation	1	Repair, encapsulate, and institute a comprehensive O&M program, including measures to eliminate any potential disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
	Hot water generator block and trowelled-on insulation	1	Repair, encapsulate, and institute a comprehensive O&M program, including measures to eliminate any potential disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
	Heating system preformed pipe insulation	7	Implement a comprehensive O&M program, including measures to reduce or eliminate disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
	Heating system fitting and valve trowelled-on insulation	7	Implement a comprehensive O&M program, including measures to reduce or eliminate disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
	Domestic water fitting and valve trowelled-on insulation	7	Implement a comprehensive O&M program, including measures to reduce or eliminate disturbance, until major renovation or demolition require removal or until hazard assessment factors change.

TABLE 3-1. ACM RESPONSE ACTIONS

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	AHERA CATEGORY	RESPONSE ACTION SUMMARIES
	Fire door	8	Implement a comprehensive O&M program, including measures to reduce or eliminate disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
02- Crawl Space	Heating system preformed pipe insulation	1	Remove and replace with non-ACM.
	Heating system fitting trowelled-on insulation	1	Remove and replace with non-ACM.
	Domestic water fitting trowelled-on insulation	1	Remove and replace with non-ACM.
03- Above Suspended Ceilings and in Pipe Chases	Heating system preformed pipe insulation	7	Implement a comprehensive O&M program, including measures to reduce or eliminate disturbance, until major renovation or demolition require removal or until hazard assessment factors change.

TABLE 3-1.- ACM RESPONSE ACTIONS

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	AHERA CATEGORY	RESPONSE ACTION SUMMARIES
	Heating system fitting trowelled-on insulation	7	Implement a comprehensive O&M program, including measures to reduce or eliminate disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
	Domestic water fitting trowelled-on insulation	7	Implement a comprehensive O&M program, including measures to reduce or eliminate disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
04- Cafeteria	Vinyl asbestos tile	8	Implement an operations and maintenance program until major renovation or demolition require removal or until hazard assessment factors change. An initial cleaning is not necessary.
	Fire doors (2)	8	Implement a comprehensive O&M program, including measures to reduce or eliminate disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
05- Incinerator Room	Domestic water fitting trowelled-on insulation	1	Repair, encapsulate, and institute a comprehensive O&M program, including measures to eliminate any potential disturbance, until major renovation or demolition require removal or until hazard assessment factors change.

TABLE 3-1. ACM RESPONSE ACTIONS

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	AHERA CATEGORY	RESPONSE ACTION SUMMARIES
	Fire door	8	Implement a comprehensive O&M program, including measures to reduce or eliminate disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
06- Hallways and Stairwells	Heating system preformed pipe insulation	5	Remove and replace with non-ACM.
	Heating system fitting trowelled-on insulation	5	Remove and replace with non-ACM.
	Vinyl asbestos tile	8	Implement a comprehensive O&M program, including measures to reduce or eliminate disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
07- Storage Areas	Heating system preformed pipe insulation	5	Repair, encapsulate, and institute a comprehensive O&M program, including measures to eliminate any potential disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
	Heating system fitting trowelled-on insulation	5	Repair, encapsulate, and institute a comprehensive O&M program, including measures to eliminate any potential disturbance, until major renovation or demolition require removal or until hazard assessment factors change.

TABLE 3-1. ACM RESPONSE ACTIONS

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	AHERA CATEGORY	RESPONSE ACTION SUMMARIES
	Domestic water fitting trowelled-on insulation	5	Repair, encapsulate, and institute a comprehensive O&M program, including measures to eliminate any potential disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
08- Classrooms	Heating system preformed pipe insulation	5	Remove and replace with non-ACM.
	Heating system fitting trowelled-on insulation	5	Remove and replace with non-ACM.
	Vinyl asbestos tile	8	Implement an operations and maintenance program until major renovation or demolition require removal or until hazard assessment factors change. An initial cleaning is not necessary.
09- Multi-Purpose Room and Stage	Heating system preformed pipe insulation	1	Remove and replace with non-ACM.

TABLE 3-1. ACM RESPONSE ACTIONS

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	AHERA CATEGORY	RESPONSE ACTION SUMMARIES
	Heating system fitting trowelled-on insulation	5	Remove and replace with non-ACM.
	Roof drain fitting trowelled-on insulation	7	Implement a comprehensive O&M program, including measures to reduce or eliminate disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
	Vinyl asbestos tile	8	Implement an operations and maintenance program until major renovation or demolition require removal or until hazard assessment factors change. An initial cleaning is not necessary.
	Fire doors (2)	8	Implement a comprehensive O&M program, including measures to reduce or eliminate disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
10- Toilets	Heating system preformed pipe insulation	5	Remove and replace with non-ACM.
	Heating system fitting trowelled-on insulation	5	Remove and replace with non-ACM.

TABLE 3-1. ACM RESPONSE ACTIONS

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	AHERA CATEGORY	RESPONSE ACTION SUMMARIES
	Domestic water fitting trowelled-on insulation	5	Remove and replace with non-ACM.
	Roof drain fitting trowelled-on insulation	5	Remove and replace with non-ACM.
11- Janitor's Closet	Domestic water fitting trowelled-on insulation	5	Repair, encapsulate, and institute a comprehensive O&M program, including measures to eliminate any potential disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
12- Offices, Health Suite, and Lounge	Heating system preformed pipe insulation	5	Repair, encapsulate, and institute a comprehensive O&M program, including measures to eliminate any potential disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
	Heating system fitting trowelled-on insulation	5	Repair, encapsulate, and institute a comprehensive O&M program, including measures to eliminate any potential disturbance, until major renovation or demolition require removal or until hazard assessment factors change.

TABLE 3-1. ACM RESPONSE ACTIONS

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	AHERA CATEGORY	RESPONSE ACTION SUMMARIES
	Domestic water fitting trowelled-on insulation	5	Repair, encapsulate, and institute a comprehensive O&M program, including measures to eliminate any potential disturbance, until major renovation or demolition require removal or until hazard assessment factors change.
	Vinyl asbestos tile	8	Implement an operations and maintenance program until major renovation or demolition require removal or until hazard assessment factors change. An initial cleaning is not necessary.
13- Library	Vinyl asbestos tile	8	Implement an operations and maintenance program until major renovation or demolition require removal or until hazard assessment factors change. An initial cleaning is not necessary.

4.0 - DETAILED DESCRIPTION OF PREVENTIVE MEASURES, RESPONSE ACTIONS, AND RESPONSE ACTION PRIORITIZATION SCHEDULE

4.1 Description of Preventive Measures and Response Actions

This section presents recommended response actions and/or preventive methods to abate or contain the ACM identified in PS221. The recommended response actions were selected using the following considerations:

(1) protects human health and the environment.
(2) can be implemented in a timely manner.
(3) least burdensome.
(4) consistent with EPA requirements for assessment category.

General response actions include removal, encapsulation, enclosure, repair, and operations and maintenance program implementation. All response actions, including removal, encapsulation, enclosure, and repair must be performed by contractors accredited to conduct such response actions (see Section 5.0).

As response actions are completed, this section will be updated annually, by means of the annual supplement, to show any change in the AHERA categories and recommended response actions. The annual supplement will reflect any change in the physical condition of any ACM noted during periodic surveillance or reinspections (see Section 7.0).

Functional Space No. 01 - Boiler Room

The ACM identified in the boiler room consists of boiler breeching block and trowelled-on insulation, hot water generator block and trowelled-on insulation, heating system preformed pipe insulation, heating system trowelled-on fitting and valve insulation, and domestic water system trowelled-on fitting and valve insulation. The fire door in the boiler room will be assumed to contain asbestos for the purposes of the management plan.

Boiler Breeching Insulation

Both boiler breechings are insulated with a combination of asbestos-containing block and trowelled-on insulation. These friable materials cover approximately 135 square feet. A small section of these

materials appears to have been removed in order to make repairs to the breeching. These materials have sustained damage due to the fact that the trowelled-on layer has delaminated. The material has also sustained cracks and isolated impact damage. This material has little or no potential for damage and is in AHERA category 1.

Recommended Response Action and Preventative Measures: Repair and encapsulate the boiler breeching insulation in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. The Designated LEA Representative should institute an operations and maintenance plan in this area (see Section 7.0). Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Hot Water Generator Insulation

The hot water generator is insulated with a combination of asbestos-containing block and trowelled-on insulation. These friable materials cover approximately 137 square feet. These materials have sustained damage due to distributed impact damage, cracking, and delamination of the trowelled-on layer. This material has little or no potential for damage and is in AHERA category 1.

Recommended Response Action and Preventative Measures: Repair and encapsulate the hot water generator insulation in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. The Designated LEA Representative should institute an operations and maintenance plan in this area (see Section 7.0). Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Heating System Pipe Insulation

The heating system piping in the boiler room is insulated with asbestos-containing preformed magnesia pipe insulation. This friable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 7.

Recommended Response Action and Preventative Measures: Implement an operations and maintenance program (see Section 7.0). The execution of any activity which could damage this material is prohibited. If such operations are required, the Designated LEA Representative should be contacted prior to such activities.

Heating System Fitting and Valve Insulation

The heating system fittings and valves in the boiler room are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 7. Maintenance personnel should use extreme care in performing maintenance activities to prevent damage to this material.

Recommended Response Action and Preventative Measures: Implement an operations and maintenance program (see Section 7.0). The execution of any activity which could damage this material is prohibited. If such operations are required, the Designated LEA Representative should be contacted prior to such activities. Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Domestic Water Fitting and Valve Insulation

The domestic water fittings and valves in the boiler room are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 7.

Recommended Response Action and Preventative Measures: Implement an operations and maintenance program (see Section 7.0). The execution of any activity which could damage this material is prohibited. If such operations are required, the Designated LEA Representative should be contacted prior to such activities. Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Fire Door

The fire door in the boiler room will be assumed to contain asbestos for the purposes of the management plan. This material has sustained little or no damage, has a potential for damage, and is in AHERA category 8.

Recommended Response Action and Preventative Measures: Institute a comprehensive operations and maintenance plan, including measures to reduce or eliminate disturbance (see Section 7.0). Door stops should be installed to protect this material (if they are not already in place). Kick plates should also be considered to provide further protection to this material. However, the replacement of hardware (i.e., locks, hinges, etc.) or the execution of any activity which could damage this material (i.e., drilling, planing, etc.) is prohibited. If such operations are necessary, the Designated LEA Representative should be contacted prior to such activities.

Functional Space No. 02 - Crawl Space

The ACM identified in the crawl space consists of heating system preformed pipe insulation, heating system fitting trowelled-on insulation, and domestic water fitting trowelled-on insulation.

Heating System Pipe Insulation

The heating system piping in the crawl space is insulated with asbestos-containing preformed magnesia pipe insulation. This friable material has sustained significant damage due to delamination, has a potential for damage, and is in AHERA category 1.

Recommended Response Action and Preventative Measures: Remove this material in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. Access to this area in the interim should be restricted to only those with the proper training and equipment to conduct asbestos abatement or response actions. Access doors to this area should be sealed.

Heating System Fitting Insulation

The heating system fittings in the crawl space are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained significant damage due to delamination, has a potential for damage, and is in AHERA category 1.

Recommended Response Action and Preventative Measures: Remove this material in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. Access to this area in the interim should be restricted to only those with the proper training and equipment to conduct asbestos abatement or response actions. Access doors to this area should be sealed.

Domestic Water Fitting Insulation

The domestic water fittings in the crawl space re insulated with asbestos-containing trowelled-on insulation. This friable material has sustained significant damage due to delamination, has a potential for damage, and is in AHERA category 1.

Recommended Response Action and Preventative Measures: Remove this material in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. Access to this area in the interim should be restricted to only those with the proper training and equipment to conduct asbestos abatement or response actions. Access doors to this area should be sealed.

Functional Space No. 03 - Above Suspended Ceilings and Pipe Chases

The ACM identified above suspended ceilings and in pipe chases consists of heating system preformed pipe insulation, heating system fitting trowelled-on insulation, and domestic water fitting trowelled-on insulation.

Heating System Pipe Insulation

The heating system piping above suspended ceilings and in pipe chases is insulated with asbestos-containing preformed magnesia pipe insulation.

This friable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 7.

Recommended Response Action and Preventative Measures: Implement an operations and maintenance program (see Section 7.0). The execution of any activity which could damage this material is prohibited. If such operations are required, the Designated LEA Representative should be contacted prior to such activities. Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Heating System Fitting Insulation

The heating system fittings above suspended ceilings and in pipe chases are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 7.

Recommended Response Action and Preventative Measures: Implement an operations and maintenance program (see Section 7.0). The execution of any activity which could damage this material is prohibited. If such operations are required, the Designated LEA Representative should be contacted prior to such activities. Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Domestic Water Fitting Insulation

The domestic water fittings above suspended ceilings and in pipe chases are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 7.

Recommended Response Action and Preventative Measures: Implement an operations and maintenance program (see Section 7.0). The execution of any activity which could damage this material is prohibited. If such operations are required, the Designated LEA Representative should be contacted prior to such activities. Maintenance personnel should use

extreme care in this area when performing maintenance activities to prevent damage to this material.

Functional Space No. 04 - Cafeteria

The ACM identified in the cafeteria consists of vinyl asbestos tile. Fire doors between the cafeteria and kitchen will be assumed to contain asbestos for the purposes of the management plan.

Vinyl Asbestos Tile

The floor tile in the cafeteria contains asbestos. This nonfriable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 8.

Recommended Response Action and Preventative Measures: Implement an operations and maintenance program (see Section 7.0). The cutting, sanding, drilling, or execution of any activity which could damage this material is prohibited. If such operations are required, the Designated LEA Representative should be contacted prior to such activities.

Fire Doors

The two fire doors between the cafeteria and kitchen will be assumed to contain asbestos for the purposes of the management plan. This material has sustained little or no damage, has a potential for damage, and is in AHERA category 8.

Recommended Response Action and Preventative Measures: Institute a comprehensive operations and maintenance plan, including measures to reduce or eliminate disturbance (See Section 7.0). Door stops should be installed to protect this material (if they are not already in place). Kick plates should also be considered to provide further protection to this material. However, the replacement of hardware (i.e., locks, hinges, etc.) or the execution of any activity which could damage this material (i.e., drilling, planing, etc.) is prohibited. If such operations are necessary, the Designated LEA Representative should be contacted prior to such activities.

Functional Space No. 05 - Incinerator Room

The ACM identified in the incinerator room consists of domestic water fitting trowelled-on insulation. The fire door in the incinerator room will be assumed to contain asbestos for the purposes of the management plan.

Domestic Water Fitting Insulation

The domestic water fittings in the boiler room are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained damage due to impact, has a potential for damage, and is in AHERA category 1.

Recommended Response Action and Preventative Measures: Repair and encapsulate the domestic water fitting insulation in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. The Designated LEA Representative should institute an operations and maintenance plan in this area (see Section 7.0). Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Fire Door

The fire door in the incinerator room will be assumed to contain asbestos for the purposes of the management plan. This material has sustained little or no damage, has a potential for damage, and is in AHERA category 8.

Recommended Response Action and Preventative Measures: Institute a comprehensive operations and maintenance plan, including measures to reduce or eliminate disturbance (see Section 7.0). Door stops should be installed to protect this material (if they are not already in place). Kick plates should also be considered to provide further protection to this material. However, the replacement of hardware (i.e., locks, hinges, etc.) or the execution of any activity which could damage this material (i.e., drilling, planing, etc.) is prohibited. If such operations are

necessary, the Designated LEA Representative should be contacted prior to such activities.

Functional Space No. 06 - Hallways and Stairwells

The ACM identified in the hallways and stairwells consists of heating system preformed pipe insulation, heating system trowelled-on fitting insulation, and vinyl asbestos tile.

Heating System Preformed Pipe Insulation

The heating system piping in the stairwell near the boiler room and the stairwell near the main office is insulated with asbestos-containing preformed magnesia pipe insulation. This friable material is protected near the floor with a metal pipe covering, has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Remove this material in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Heating System Fitting Insulation

The heating system fittings in hallways and stairwells are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Remove this material in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Vinyl Asbestos Tile

The floor tile in the hallways contains asbestos. This nonfriable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 8.

Recommended Response Action and Preventative Measures: Implement an operations and maintenance program (see Section 7.0). The cutting, sanding, drilling, or execution of any activity which could damage this material is prohibited. If such operations are required, the Designated LEA Representative should be contacted prior to such activities.

Functional Space No. 07 - Storage Areas

The ACM identified in the storage areas consists of heating system preformed pipe insulation, heating system trowelled-on fitting insulation, and domestic water trowelled-on fitting insulation.

Heating System Pipe Insulation

The heating system piping in both the book storage and general storage areas is insulated with asbestos-containing preformed magnesia pipe insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Encapsulate the heating system pipe insulation in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. The Designated LEA Representative should institute an operations and maintenance plan in this area (see Section 7.0). Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Heating System Fitting Insulation

The heating system fittings in both the book storage and general storage areas are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Encapsulate the heating system fitting insulation in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. The Designated LEA Representative should institute an operations and maintenance plan in this area (see Section 7.0). Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Domestic Water Fitting Insulation

The domestic water fittings in both the book storage and general storage areas are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Encapsulate the domestic water fitting insulation in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. The Designated LEA Representative should institute an operations and maintenance plan in this area (see Section 7.0). Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Functional Space No. 08 - Classrooms

The ACM identified in the classrooms consists of heating system preformed pipe insulation, heating system trowelled-on fitting insulation, and vinyl asbestos tile.

Heating System Pipe Insulation

A portion of the heating system piping in classrooms 1, 3, 101, 104, 201, and 206 is insulated with asbestos-containing preformed magnesia pipe insulation. The piping near the floor is enclosed with metal pipe jackets while that near the ceiling is exposed. A portion or all of the heating system piping in rooms 103, 201, and 206 are insulated with fiberglass,

but it is difficult to characterize that insulation enclosed by the metal jacket. For this reason, the concealed insulation will be assumed to contain asbestos until the character of the insulation is established. This material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Remove this material in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material in the interim.

Heating System Fitting Insulation

The heating system fittings in classrooms 1, 3, 101, 104, 201, and 206 are insulated with asbestos-containing trowelled-on insulation. In most cases, the fittings are partially protected by metal enclosures. In all cases, this material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Remove this material in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material in the interim.

Vinyl Asbestos Tile

The floor tile in the classrooms contains asbestos. This nonfriable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 8.

Recommended Response Action and Preventative Measures: Implement an operations and maintenance program (see Section 7.0). The cutting, sanding, drilling, or execution of any activity which could damage this material is prohibited. If such operations are required, the Designated LEA Representative should be contacted prior to such activities.

Functional Space No. 09 - Multi-Purpose Room and Stage

The ACM identified in the multi-purpose room and stage consists of heating system preformed pipe insulation, heating system trowelled-on fitting insulation, roof drain trowelled-on fitting insulation, and vinyl asbestos tile. Fire doors on the stage will be assumed to contain asbestos for the purposes of the management plan.

Heating System Pipe Insulation

The heating system piping on the stage is insulated with asbestos-containing preformed magnesia pipe insulation. A section of this friable material is missing and the ends of the exposed material has been taped. This material has sustained damage, has a potential for damage, and is in AHERA category 1.

Recommended Response Action and Preventative Measures: Remove this material in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material in the interim.

Heating System Fitting Insulation

The heating system fittings on the stage are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Remove this material in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material in the interim.

Roof Drain Fitting Insulation

The roof drain fittings in the multi-purpose room are insulated with asbestos-containing trowelled-on insulation. This friable material has

sustained little or no damage, has little or no potential for damage, and is in AHERA category 7.

Recommended Response Action and Preventative Measures: Implement an operations and maintenance program (see Section 7.0). The execution of any activity which could damage this material is prohibited. If such operations are required, the Designated LEA Representative should be contacted prior to such activities.

Vinyl Asbestos Tile

The floor tile in the multi-purpose room contains asbestos. This nonfriable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 8.

Recommended Response Action and Preventative Measures: Implement an operations and maintenance program (see Section 7.0). The cutting, sanding, drilling, or execution of any activity which could damage this material is prohibited. If such operations are required, the Designated LEA Representative should be contacted prior to such activities.

Fire Doors

The two fire doors on the stage will be assumed to contain asbestos for the purposes of the management plan. This material has sustained little or no damage, has a potential for damage, and is in AHERA category 8.

Recommended Response Action and Preventative Measures: Institute a comprehensive operations and maintenance plan, including measures to reduce or eliminate disturbance (see Section 7.0). Door stops should be installed to protect this material (if they are not already in place). Kick plates should also be considered to provide further protection to this material. However; the replacement of hardware (i.e., locks, hinges, etc.) or the execution of any activity which could damage this material (i.e., drilling, planing, etc.) is prohibited. If such operations are necessary, the Designated LEA Representative should be contacted prior to such activities.

Functional Space No. 10 - Toilets

The ACM identified in the staff and student toilets consists of heating system preformed pipe insulation, heating system trowelled-on fitting insulation, domestic water trowelled-on fitting insulation, domestic water trowelled-on fitting insulation, and roof drain trowelled-on fitting insulation.

Heating System Pipe Insulation

The heating system piping in both the staff and student toilets is insulated with asbestos-containing preformed magnesia pipe insulation. This material is protected by metal enclosures near the floor in student toilets while it is exposed near the ceiling of student toilets and in staff toilets. This material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Remove this material in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material in the interim.

Heating System Fitting Insulation

The heating system fittings in the staff and student toilets are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Remove this material in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material in the interim.

Domestic Water Fitting Insulation

The domestic water fittings in the staff and student toilets are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Remove this material in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material in the interim.

Roof Drain Fitting Insulation

The roof drain fittings in the staff and student toilets are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Remove this material in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material in the interim.

Functional Space No. 11 - Janitor's Closet

The ACM identified in the janitor's closets consists of domestic water fitting insulation. This friable trowelled-on material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Encapsulate the domestic water fitting insulation in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. The Designated LEA Representative should institute an operations and maintenance plan in this area (see Section 7.0). Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Functional Space No. 12 - Offices, Health Suite, and Lounge

The ACM identified in the main office suite, the health suite, the gymnasium office, and the teachers' lounge consists of heating system preformed pipe insulation, heating system trowelled-on fitting insulation, domestic water trowelled-on fitting insulation, and vinyl asbestos tile.

Heating System Pipe Insulation

The heating system pipe insulation in the health suite and the gymnasium office are insulated with asbestos-containing preformed magnesia pipe insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Encapsulate the heating system pipe insulation in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. The Designated LEA Representative should institute an operations and maintenance plan in this area (see Section 7.0). Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Heating System Fitting Insulation

The heating system fittings in the health suite and the gymnasium office are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Encapsulate the heating system fitting insulation in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. The Designated LEA Representative should institute an operations and maintenance plan in this area (see Section 7.0). Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Domestic Water Fitting Insulation

The domestic water fittings in the main office suite and the health suite are insulated with asbestos-containing trowelled-on insulation. This friable material has sustained little or no damage, has a potential for damage, and is in AHERA category 5.

Recommended Response Action and Preventative Measures: Encapsulate the domestic water fitting insulation in accordance with the Baltimore City asbestos specification document on file at 200 East North Avenue. The Designated LEA Representative should institute an operations and maintenance plan in this area (see Section 7.0). Maintenance personnel should use extreme care in this area when performing maintenance activities to prevent damage to this material.

Vinyl Asbestos Tile

The floor tile in the main office suite, the health suite, the teachers' lounge, and the gymnasium office contains asbestos. This nonfriable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 8.

Recommended Response Action and Preventative Measures: Implement an operations and maintenance program (see Section 7.0). The cutting, sanding, drilling, or execution of any activity which could damage this material is prohibited. If such operations are required, the Designated LEA Representative should be contacted prior to such activities.

Functional Space No. 13 - Library

The ACM identified in the library consists of vinyl asbestos tile. This nonfriable material has sustained little or no damage, has little or no potential for damage, and is in AHERA category 8.

Recommended Response Action and Preventative Measures: Implement an operations and maintenance program (see Section 7.0). The cutting, sanding, drilling, or execution of any activity which could damage this material is prohibited. If such operations are required, the Designated LEA Representative should be contacted prior to such activities.

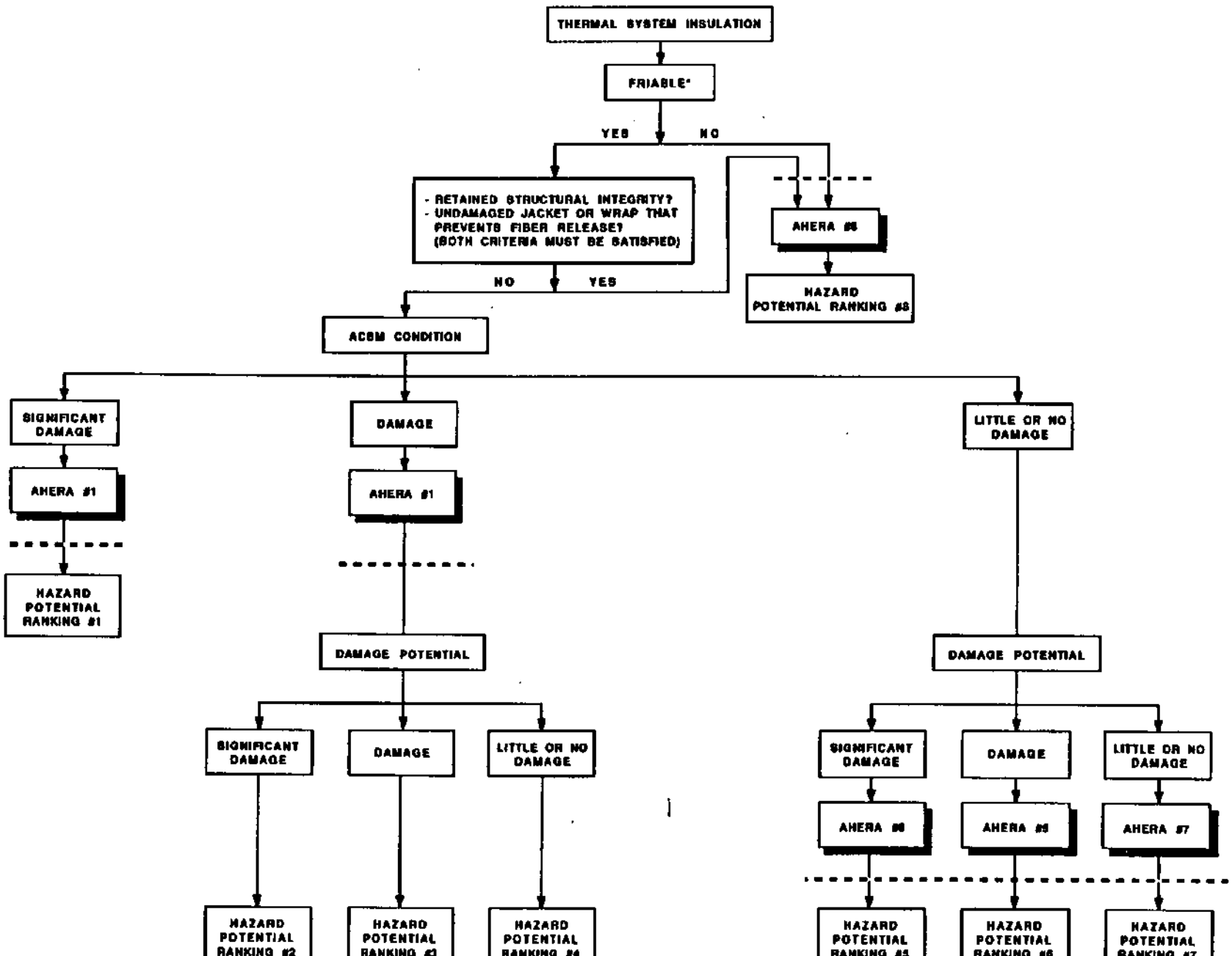
4.2 Response Action Schedule

To assist in the response action scheduling process, a prioritization system has been developed. This system guided the scheduling process by providing a prioritization number based on a hazard potential ranking to each ACM location within the building. It should be noted that the ranking does not necessarily identify the existence or lack of existence of a specific hazard, only a general order, from highest to lowest, of the potential for some hazard. It is also not intended to establish or require a strict order of response actions.

The prioritization system is an extension of the assessment process where each of the ACM applications in each functional space is categorized (see Section 1.3). The process for extending the assessment to assign a hazard potential rank is represented by decision trees for TSI and surfacing/miscellaneous ACM in Figures 4-1 and 4-2, respectively.

The priority position for each ACM location is determined by the hazard potential rank, with number 1 being the highest potential and number 8 being the lowest potential. To provide a priority position for those locations having the same hazard potential rank, each rank is weighted by the estimated person exposure hours per week in the functional space. The ACM application with the highest number of estimated exposure hours has the highest priority of those with the same rank.

Table 4-1 presents the ACM location priority list for this school building. The ACM abatement schedule is provided in Appendix D.



* BY AHERA, SECTION 763.83, "DEFINITIONS"

FIGURE 4-1. AHERA CLASSIFICATION "DECISION TREE" THERMAL SYSTEM INSULATION

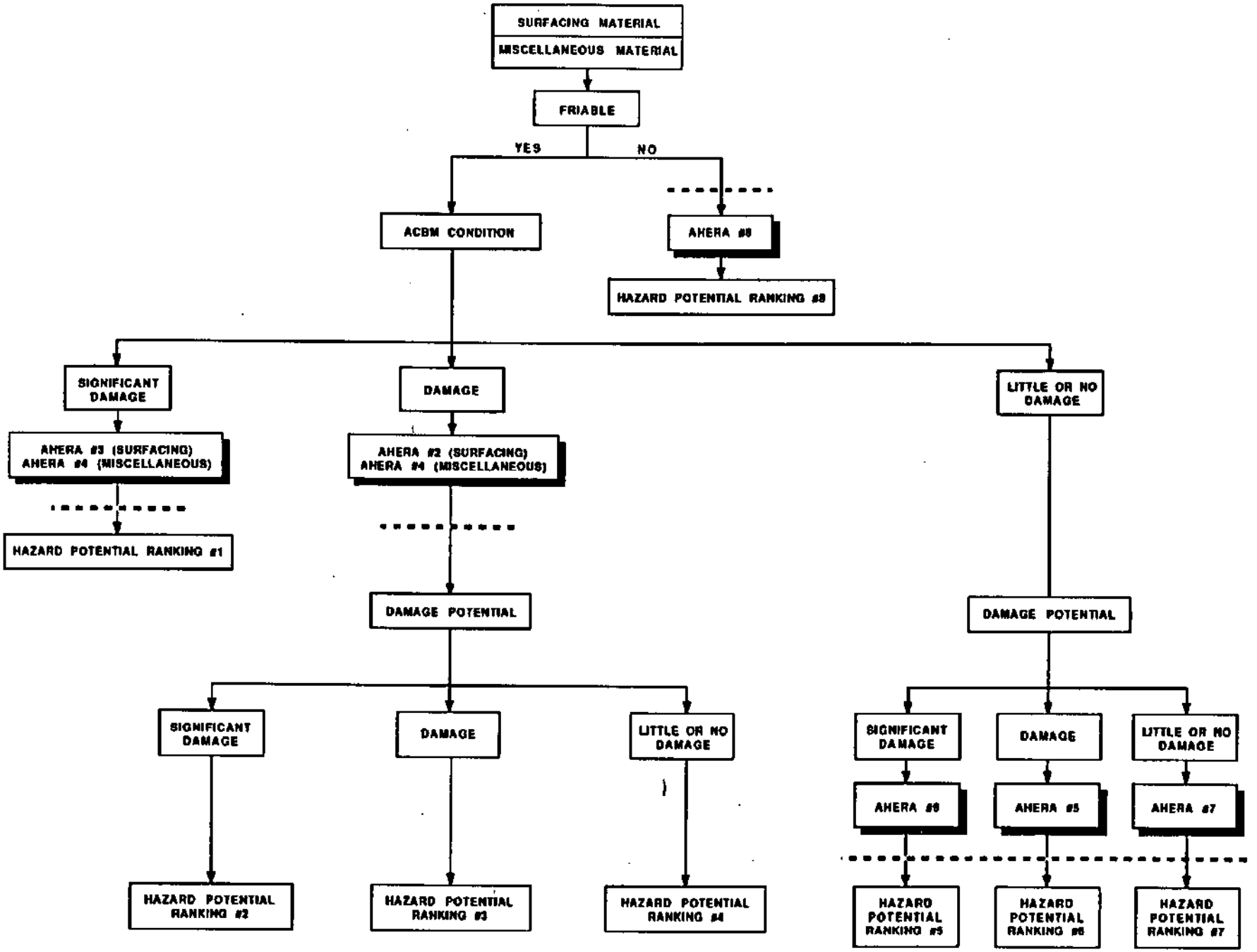


FIGURE 4-2. AHERA CLASSIFICATION "DECISION TREE" SURFACING AND MISCELLANEOUS ACBM

TABLE 4-1 - ACM LOCATION PRIORITY FOR PS221

PRIORITY	FUNCTIONAL SPACE	DESCRIPTION	ESTIMATED CUMULATIVE EXPOSURE HRS	HAZARD POTENTIAL RANK
4	01- Boiler Room	Boiler breeching block and trowelled-on insulation	10	4
4		Hot water generator block and trowelled-on insulation	10	4
13		Heating system preformed pipe insulation	10	7
13		Heating system fitting and valve trowelled-on insulation	10	7
13		Domestic water fitting and valve trowelled-on insulation	10	7
21		Fire door	10	8
1	02- Crawl Space	Heating system preformed pipe insulation	1	1
1		Heating system fitting trowelled-on insulation	1	1
1		Domestic water fitting trowelled-on insulation	1	1
14	03- Above Suspended Ceilings and in Pipe Chases	Heating system preformed pipe insulation	1	7
14		Heating system fitting trowelled-on insulation	1	7

TABLE 4-1 - ACM LOCATION PRIORITY FOR PS221

PRIORITY	FUNCTIONAL SPACE	DESCRIPTION	ESTIMATED CUMULATIVE EXPOSURE HRS	HAZARD POTENTIAL RANK
14		Domestic water fitting trowelled-on insulation	1	7
16	04- Cafeteria	Vinyl asbestos tile	381	8
16		Fire doors (2)	381	8
3	05- Incinerator Room	Domestic water fitting trowelled-on insulation	15	3
20		Fire door	15	8
7	06- Hallways and Stairwells	Heating system preformed pipe insulation	381	6
7		Heating system fitting trowelled-on insulation	381	6
16		Vinyl asbestos tile	381	8
11	07- Storage Areas	Heating system preformed pipe insulation	20	6
11		Heating system fitting trowelled-on insulation	20	6
11		Domestic water fitting trowelled-on insulation	20	6
6	08- Classrooms	Heating system preformed pipe insulation	900	6
6		Heating system fitting trowelled-on insulation	900	6
15		Vinyl asbestos tile	8,875	8

TABLE 4-1 - ACM LOCATION PRIORITY FOR PS221

PRIORITY	FUNCTIONAL SPACE	DESCRIPTION	ESTIMATED CUMULATIVE EXPOSURE HRS	HAZARD POTENTIAL RANK
2	09- Multi-Purpose Room and Stage	Heating system preformed pipe insulation	378	3
8		Heating system fitting trowelled-on insulation	378	6
12		Roof drain fitting trowelled-on insulation	378	7
17		Vinyl asbestos tile	378	8
17		Fire doors (2)	378	8
5	10- Toilets	Heating system preformed pipe insulation	953	6
5		Heating system fitting trowelled-on insulation	953	6
5		Domestic water fitting trowelled-on insulation	953	6
5		Roof drain fitting trowelled-on insulation	953	6
10	11- Janitor's Closet	Domestic water fitting trowelled-on insulation	30	6
9	12- Offices, Health Suite, and Lounge	Heating system preformed pipe insulation	46	6
9		Heating system fitting trowelled-on insulation	46	6

TABLE 4-1 - ACM LOCATION PRIORITY FOR PS221

PRIORITY	FUNCTIONAL SPACE	DESCRIPTION	ESTIMATED CUMULATIVE EXPOSURE HRS	HAZARD POTENTIAL RANK
9		Domestic water fitting trowelled-on insulation	46	6
19		Vinyl asbestos tile	46	8
18	13- Library	Vinyl asbestos tile	70	8

5.0 - CONTRACTOR ACCREDITATION

It is the intention of the Board to use contractors to perform all asbestos operations and maintenance activities and all response actions recommended by this plan.

Currently the Board has contracted with the Marcor Group, Inc., to design and conduct necessary asbestos abatement activities. Marcor is licensed by the State of Maryland as an asbestos abatement contractor, and Marcor's employees have attained the appropriate accreditation by successfully completing all applicable EPA-approved AHERA courses developed under Section 206(c) of Title II of the Toxic Substances Control Act (TSCA).

William A. Gieseking, the Designated LEA Representative, will ensure that any future contractors will be accredited by another state which has adopted a contractor accreditation plan under Section 206(b) of Title II of the Toxic Substances Control Act (TSCA), or are accredited by an EPA-approved course under Section 206(c) of Title II of the Toxic Substances Control Act (TSCA).

6.0 - DESCRIPTION AND LOCATION OF REMAINING ACM

The ACM in this school at the time of the inspection is as described in Table 1-A, Section 1.2, and further defined in the text of Section 1.2. Response actions and conditions and extent of any remaining ACM following a response action are contained in Appendix C. Appendix C will be updated annually and will document all response actiors that affect the quantity of ACM remaining at any location in the building. The nature of the response action and the condition and extent of any remaining ACM will be described.

7.0 - OPERATIONS AND MAINTENANCE PLAN, PERIODIC SURVEILLANCE PLAN, AND REINSPECTION PLAN

7.1 Operations and Maintenance Plan

An operations, maintenance, and repair (O&M) program shall be implemented related to all friable ACM present in the school and any nonfriable ACM when the material is about to become friable as a result of activities in the school. The specific O&M procedures and practices related to the actual ACM applications in this building are contained in Appendix E. The program is designed to prevent disturbance of existing ACM, prevent fiber releases, and educate workers. As a matter of Board policy, all activities that disturb or will potentially disturb ACM will be performed by licensed asbestos contractors. The work procedures and health and safety practices that all contractors must follow under this plan are defined in the Baltimore City Technical Specifications for asbestos work. This document is on file at the Physical Plant Office of the Baltimore City Department of Education at 200 E. North Avenue.

7.1.1 Worker Protection

The asbestos fiber cleaning required under this O&M plan and all maintenance, repair, and abatement activities will be performed by contractors. This O&M plan requires that the contractor and his employees strictly follow the health and safety practices described in the Baltimore City Technical Specifications for asbestos work. Although the school workers will not normally be involved in activities involving the disturbance of ACM, they will be instructed during their awareness training (see Section 7.4 Training) to notify the Designated LEA Representative if they notice ACM that has been disturbed or see conditions that may result in a fiber release episode. Since the school workers are not involved in activities related to disturbance of ACM, there are no applicable worker protection requirements.

7.1.2 Cleaning

Areas of the school where friable ACM or damaged or significantly damaged TSI is present will undergo an initial cleaning. The cleaning will be performed by contractors using procedures and health and safety

practices defined in the Baltimore City Technical Specifications for asbestos work. The procedures will meet the minimum requirements of EPA.

After the initial cleaning, additional cleaning (using the same procedures) will be performed by contractor personnel prior to any response action, other than O&M or repair, or at the direction of the Designated LEA Representative. The LEA agrees with this recommendation for additional cleaning.

7.1.3 Other O&M Activities

A warning label shall be placed immediately adjacent to any friable and nonfriable ACBM and suspected ACBM assumed to be ACM located in routine maintenance areas (such as boiler rooms). The warning label shall be readily visible because of bright color or large size and read as follows:

CAUTION: ASBESTOS
HAZARDOUS: DO NOT DISTURB
WITHOUT PROPER TRAINING AND EQUIPMENT

7.1.4 Fiber Release Episode

In the event of a major or minor fiber release, the school principal is to be notified immediately. The principal is to restrict entry to the area and immediately notify the Designated LEA Representative by telephone (No. (301) 396-8672) of the release problem. In the event that the school principal is not on site at the time of the release, the assistant principal or lead maintenance/custodial/operating engineer person should be notified and that person should follow the restriction and notification procedures.

7.2 Periodic Surveillance Plan

Periodic surveillance shall be conducted quarterly from the date of this management plan by a Baltimore City School Operations Area Supervisor.

The Operations Area Supervisor must be familiar with the school buildings in order to accurately note any changes in the ACM. The supervisor shall also be responsible for ensuring that the required labeling of areas where ACM is present is intact.

The person performing the quarterly surveillance shall:

- Visually inspect all ACM or assumed ACM locations.
- Record the date of the surveillance, his or her name, and any changes in the condition of the materials (e.g., an increase in the friability of the material and/or an increase in the size of a damaged area by more than 5% in area or length).
- Submit to the Designated LEA Representative a copy of the quarterly surveillance report for inclusion in the annual update of the management plan.

A sample quarterly surveillance reporting form is included as Figure 7-1. The person conducting the surveillance is to indicate any change in ACM condition for each location by indicating a "yes" or "no" as appropriate. Any "yes" requires a written explanation of the observed change in condition. For the initial surveillance, the surveyor must review the Management Plan to establish ACM condition at the time of the inspection. It would be beneficial to have the same individual conduct subsequent surveillance activities, because the same person would be more likely to notice changes in the condition of the ACM. If a person who is unfamiliar with the school conducts periodic surveillance, the person needs to discuss ACM condition with staff operations personnel and review the records of the most recent surveillance and inspection prior to surveillance.

In addition to the quarterly surveillance, daily surveillance shall be performed by the lead maintenance/custodial/operating engineer person on duty at the school. The surveillance will entail visual observation of ACM condition changes during the course of normal maintenance activities. If condition changes are observed, the maintenance person is to contact the school principal immediately.

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
01- Boiler Room	Boiler breeching block and trowelled-on insulation									
	Hot water generator block and trowelled-on insulation									
	Heating system preformed pipe insulation									
	Heating system fitting and valve trowelled-on insulation									
	Domestic water fitting and valve trowelled-on insulation									
	Fire door									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
02- Crawl Space	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Domestic water fitting trowelled-on insulation									
03- Above Suspended Ceilings and in Pipe Chases	Heating system preformed pipe insulation									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
06- Hallways and Stairwells	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Vinyl asbestos tile									
07- Storage Areas	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Domestic water fitting trowelled-on insulation									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Heating system fitting trowelled-on insulation									
	Domestic water fitting trowelled-on insulation									
04- Cafeteria	Vinyl asbestos tile									
	Fire doors (2)									
05- Incinerator Room	Domestic water fitting trowelled-on insulation									
	Fire door									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
08- Classrooms	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Vinyl asbestos tile									
09- Multi-Purpose Room and Stage	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation									
	Vinyl asbestos tile									
	Fire doors (2)									
ID- Toilets	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Domestic water fitting trowelled-on insulation									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation									
11- Janitor's Closet	Domestic water fitting trowelled-on insulation									
12- Offices, Health Suite, and Lounge	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Domestic water fitting trowelled-on insulation									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Vinyl asbestos tile									
13- Library	Vinyl asbestos tile									

7.3 Reinspection Plan

Every 3 years from the date of this management plan, the school shall be reinspected by an accredited inspector for all friable and nonfriable ACM in the building. For each area of the school building the inspector shall:

- Visually reinspect and reassess the condition of all known friable ACM.
- Visually inspect material that was previously considered nonfriable ACM and determine whether it has become friable since the last inspection or reinspection.
- Identify any homogeneous areas with material that has become friable since the last inspection or reinspection.
- Assess the condition of the newly friable material in areas where samples are collected.
- Reassess the condition of friable ACM previously identified.
- Provide a copy of the reinspection report to the Designated LEA Representative.

Copies of all reinspection reports shall be appended to this management plan.

7.4 Training

Prior to the implementation of the operations, maintenance, and repair provisions of the management plan, the Designated LEA Representative shall ensure that all members of its maintenance and custodial staff (i.e., custodians, electricians, heating/air conditioning engineers, plumbers, repair shop employees, etc.) who work in a building that contains ACM receive awareness training of at least 2 hours. Minimum training shall include, but not be limited to:

- Information regarding asbestos and its various uses and forms;
- Information on health effects associated with asbestos exposure;

- Locations of ACM identified throughout the school buildings in which they work;
- Recognition of damage, deterioration, and delamination of ACM;
- The name and telephone number of the designated person designated by the LEA as the contact point for asbestos related matters and management; and
- The availability and location of the management plan.

In addition, the awareness training shall include information regarding ACM location code marks in public areas, how tc recognize and report changes in ACM condition, and emergency procedures for fiber releases. Work practices that minimize any chance for disturbance of ACM will be emphasized.

Participation in the above training program shall be documented in an attendance roster. A certificate of attendance shall be completed for each employee with a copy maintained in his/her personnel file. New custodial and maintenance employees shall be trained within 60 days after commencement of employment. A 2-hour refresher training program shall be provided to all custodial and maintenance employees on ar annual basis and be documented with a certificate of attendance.

8.0 - NOTIFICATION AND MANAGEMENT PLAN AVAILABILITY

The Board of School Commissioners of Baltimore City as the LEA is required under Section 763.93 (see Appendix B) of AHERA to maintain and make available for review all management plans prepared for school buildings within the Baltimore City Public School System. Specific requirements include:

- A complete set of management plans for all buildings in the school system shall be maintained at the Board of School Commissioners administrative offices;
- Public notice of plan availability shall be provided annually (i.e., through ads in local newspapers, notices to parent-teacher associations and organizations and letters to parents when there is no parent-teacher organization in-place, newsletters, etc.);
- Provide annual notice to interested parties regarding results of (re-)inspections, response actions, and periodic surveillance programs either planned or in progress;
- Update management plans to reflect changes in conditions of ACM identified through (re-)inspections, periodic surveillance, or brought about through response actions or building renovation; and
- A listing of organizations notified and documentation describing the method of notification shall be included in the annual update to the management plan.

The Baltimore City Public Schools have taken the following steps to notify parents, teachers, and employees of the availability of the Asbestos Management Plans:

- A letter from Dr. Richard C. Hunter, Superintendent of Public Instruction, addressed to parents and personnel of the Baltimore City Public Schools regarding the May 9, 1989, availability of the Asbestos Management Plans will be issued. This letter will be attached to a memorandum of distribution addressed to principals, union leaders, and parent organization leaders.
- A circular regarding availability of Asbestos Management Plans will be issued to deputy superintendents, chief financial officers, associate and assistant superintendents, executive directors, heads of central office units, and principals.

A dated copy of the above items will be included in the Asbestos Management Plans (see Appendix G).

Records must be kept of all relevant events occurring after submission of the management plan. These records become part of the management plan through annual updates to the plan. The relevant events include:

- Response actions and response measures
- Training of personnel
- Periodic surveillance
- Reinspections and assessments
- Cleaning activities
- Maintenance request activities
- Fiber release episodes

9.0 - LEA RESOURCE EVALUATION

The current approximate cost to remove all the ACM from PS221 is $732,711. In the event the Baltimore City Board of School Commissioners decide not to completely remove all the ACM within PS221, the following costs are applicable.

The Annual Operation and Maintenance activity cost is approximately $3,800 per year. The Initial Cleaning cost is approximately $1,400. The estimated cost for the ACM encapsulation and/or enclosure at PS221 is $1,500.

Table 9-1 lists the encapsulation and repair costs per material in each functional space in PS221. The encapsulation costs include the costs for minor repairs, patching, etc. The repair costs include removal of damaged ACM and the subsequent replacement cost of non-ACM.

It should be noted that the estimated costs for response actions that require containment and subsequent clearance for reoccupancy (removal, encapsulation, enclosure, and sometimes repair) include costs for clearance air sampling using phase contrast microscopy (PCM). This air sampling technology is being phased-out by EPA in favor of transmission electron microscopy (TEM). By the time many of the response actions for this building are carried out, TEM clearance may be required. The costs associated with TEM clearance are substantial, averaging about $5,000 per response action location, and may amount to a significant addition to the costs estimated herein.

The schedule attached in Appendix D is based on committed finances for fiscal 1990 and annually thereafter and possibly may be accelerated by the availability of additional financial aid. The committed finances include funds for conducting the 2-hour awareness training courses.

TABLE 9-1 RESPONSE ACTION COSTS

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	TYPE	AHERA CATEGORY	PRIORITY	RESPONSE ACTION	COST
01- Boiler Room	Boiler breeching block and trowelled-on insulation	TSI	1	4	Encapsulate	$338
	Hot water generator block and trowelled-on insulation	TSI	1	4	Encapsulate	$343
	Heating system preformed pipe insulation	TSI	7	13	O&M	*
	Heating system fitting and valve trowelled-on insulation	TSI	7	13	O&M	*
	Domestic water fitting and valve trowelled-on insulation	TSI	7	13	O&M	*
	Fire door	MISC	8	21	O&M	*

Mount Washington Elementary School PS221
(0840k)

TABLE 3-1 RESPONSE ACTION COSTS

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	TYPE	AHERA CATEGORY	PRIORITY	RESPONSE ACTION	COST
02- Crawl Space	Heating system preformed pipe insulation	TSI	1	1	Removal	$56,696
	Heating system fitting trowelled-on insulation	TSI	1	1	Removal	$32,984
	Domestic water fitting trowelled-on insulation	TSI	1	1	Removal	$20,398
03- Above Suspended Ceilings and in Pipe Chases	Heating system preformed pipe insulation	TSI	7	14	O&M	*
	Heating system fitting trowelled-on insulation	TSI	7	14	O&M	*

Mount Washington Elementary School PS221
(0840k)

TABLE 9-1 RESPONSE ACTION COSTS

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	TYPE	AHERA CATEGORY	PRIORITY	RESPONSE ACTION	COST
	Domestic water fitting trowelled-on insulation	TSI	7	14	O&M	*
04- Cafeteria	Vinyl asbestos tile	MISC	8	16	O&M	*
	Fire doors (2)	MISC	8	16	O&M	*
05- Incinerator Room	Domestic water fitting trowelled-on insulation	TSI	1	3	Encapsulate	$15
	Fire door	MISC	8	20	O&M	*
06- Hallways and Stairwells	Heating system preformed pipe insulation	TSI	5	7	Removal	$3,100
	Heating system fitting trowelled-on insulation	TSI	5	7	Removal	$3,906
	Vinyl asbestos tile	MISC	8	16	O&M	*

TABLE 9-1 RESPONSE ACTION COSTS

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	TYPE	AHERA CATEGORY	PRIORITY	RESPONSE ACTION	COST
07- Storage Areas	Heating system preformed Pipe Insulation	TSI	5	11	Encapsulate	$108
	Heating system fitting trowelled-on insulation	TSI	5	11	Encapsulate	$220
	Domestic water fitting trowelled-on insulation	TSI	5	11	Encapsulate	$134
08- Classrooms	Heating system preformed pipe insulation	TSI	5	6	Removal	$3,720
	Heating system fitting trowelled-on insulation	TSI	5	6	Removal	$4,340
	Vinyl asbestos tile	MISC	8	15	O&M	*
09- Multi-Purpose Room and Stage	Heating system preformed pipe insulation	TSI	1	2	Removal	$2,790

Mount Washington Elementary School PS221
(0840k)

TABLE 9-1 RESPONSE ACTION COSTS

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	TYPE	AHERA CATEGORY	PRIORITY	RESPONSE ACTION	COST
	Heating system fitting trowelled-on insulation	TSI	5	8	Removal	$1,085
	Roof drain fitting trowelled-on insulation	TSI	7	12	O&M	*
	Vinyl asbestos tile	MISC	8	17	O&M	*
	Fire doors (2)	MISC	8	17	O&M	*
10- Toilets	Heating system preformed pipe insulation	TSI	5	5	Removal	$4,030
	Heating system fitting trowelled-on insulation	TSI	5	5	Removal	$4,774
	Domestic water fitting trowelled-on insulation	TSI	5	5	Removal	$3,038

TABLE 9-1 RESPONSE ACTION COSTS

FUNCTIONAL SPACE	MATERIAL DESCRIPTION	TYPE	AHERA CATEGORY	PRIORITY	RESPONSE ACTION	COST
	Roof drain fitting trowelled-on insulation	TSI	5	5	Removal	$217
11- Janitor's Closet	Domestic water fitting trowelled-on insulation	TSI	5	10	Encapsulate	$55
12- Offices, Health Suite, and Lounge	Heating system preformed pipe insulation	TSI	5	9	Encapsulate	$126
	Heating system fitting trowelled-on insulation	TSI	5	9	Encapsulate	$85
	Domestic water fitting trowelled-on insulation	TSI	5	9	Encapsulate	$75
	Vinyl asbestos tile	MISC	8	19	O&M	*
13- Library	Vinyl asbestos tile	MISC	8	18	O&M	*

*The Operations and Maintenance cost and Initial Cleaning (40 CFR 763.91(c)) costs are given as a lump sum per building (see Section 9.0).

10.0 - CONSULTANT ACCREDITATION INFORMATION

Baltimore City has retained the following consulting firm to prepare Asbestos Management Plans for all schools in the City:

Versar, Inc.
6850 Versar Center
Springfield, Virginia 22151

(703) 750-3000

The identification and accreditation information for the Versar personnel involved in the building inspection and the development of this management plan is provided in Sections 1.1 and 3.0, respectively. These personnel are accredited by an EPA-approved course developed under Section 206(c) of Title II of the Toxic Substances Control Act (TSCA). Copies of the accreditation/reaccreditation certificates are provided in Appendix F.

Versar Inc.

APPENDIX A

ASBESTOS BULK SAMPLING LABORATORY DATA SHEETS

UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
(formerly National Bureau of Standards)
Gaithersburg, Maryland 20899

April 1, 1989

Marcie Wilson
Versar Inc.
6850 Versar Center
Springfield, VA 22151

NVLAP LAB CODE 1122

Dear Ms. Wilson:

I am pleased to inform you that initial accreditation for Bulk Asbestos Analysis by PLM is granted to your organization under the National Voluntary Laboratory Accreditation Program (NVLAP). This accreditation is effective until April 1, 1990, provided that your organization continues to comply with accreditation requirements contained in the NVLAP Procedures.

Your Certificate of Accreditation is enclosed along with a statement of your Scope of Accreditation. You may reproduce these documents in their entirety and announce your organization's accreditation status using the NVLAP logo (enclosed) in business publications, the trade press, and other business oriented literature. Accreditation does not relieve your organization from observing and complying with any applicable existing laws and/or regulations.

We are pleased to have you participate in NVLAP and look forward to your continued association with this program. If you have any questions concerning your NVLAP accreditation, please direct them to: John L. Donaldson, Manager, Laboratory Accreditation, National Institute of Standards and Technology, Admin A527, Gaithersburg, MD 20899; (301) 975-4016.

Sincerely,

Stanley I. Warshaw, Associate Director for
Industry and Standards

Enclosures

National Institute of Standards and Technology

NVLAP

National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION

ASBESTOS FIBER ANALYSIS NVLAP LAB CODE 1122

Versar Inc.
6850 Versar Center
Springfield, VA 22151
Marcie Wilson Phone: 703-750-3000

Accreditation Renewal Date: April 1, 1990

NVLAP Test Method Code	Test Method Designation
18/A01	40 Code of Federal Regulations Chapter I (1-1-87 edition) Part 763, Subpart F, Appendix A, pages 293-299 or the current U.S. Environmental Protection Agency method for the analysis of asbestos in building materials by polarized light microscopy.

DEPARTMENT OF COMMERCE · UNITED STATES OF AMERICA

For the National Institute of Standards and Technology

United States Department of Commerce
National Institute of Standards and Technology

NVLAP

Certificate of Accreditation

VERSAR INC.
SPRINGFIELD, VA

is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 7 Code of Federal Regulations. Accreditation is awarded for specific services, listed on the Scope of Accreditation, for:

ASBESTOS FIBER ANALYSIS

April 1, 1990
Effective until

DEPARTMENT OF COMMERCE • UNITED STATES OF AMERICA •

For the National Institute of Standards and Technology

UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
(formerly National Bureau of Standards)
Gaithersburg, Maryland 20899

March 22, 1989

Marcie Wilson
Versar Inc.
6850 Versar Center
Springfield, VA 22151

NVLAP Lab Code 1122

Dear Ms. Wilson:

Congratulations! You have passed the January round of Proficiency Testing for the National Voluntary Laboratory Accreditation Program for Bulk Asbestos. You will be notified if there are any other requirements you must meet to obtain accreditation under the Program.

We will begin issuing accreditation certificates in April. Yours will be issued when it has been determined that you have satisfied all the requirements for accreditation.

Sincerely,

John L. Donaldson, Manager
Laboratory Accreditation

UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
[formerly National Bureau of Standards]
Gaithersburg, Maryland 20899

JAN 2 6 1989

Ms. Marcie Wilson
Versar Inc.
6850 Versar Center
Springfield, VA 22151

NVLAP Lab Code 1122

Dear Ms. Wilson:

On December 15, 1988 your laboratory was visited by a Technical Expert representing the National Institute for Standards and Technology (NIST). The purpose of the visit was to assess your laboratory's compliance with National Voluntary Laboratory Accreditation (NVLAP) criteria for accreditation under the Bulk Asbestos Program.

In a report sent to NVLAP (and given to you before leaving the laboratory) the Technical Expert noted certain deficiencies which must be resolved before NIST accreditation can be granted. Your letter of January 12, 1989, described actions you have proposed (or taken) to resolve those deficiencies. A preliminary review of that submittal indicates that all deficiencies have been fully resolved. However, the Assessment Report and your submittal will receive a final review by a panel of Technical Experts, assisting NVLAP, to confirm that all deficiency responses are fully satisfactory. You will be notified if the panel requires any additional information regarding your laboratory in order to make accreditation recommendations to NVLAP.

Your laboratory must also satisfactorily participate in NVLAP proficiency testing before NIST accreditation can be granted.

Please call Harvey Berger or David Alderman, on 301-975-4016, for information on your laboratory's accreditation status or guidance on actions you must take to comply with accreditation requirements.

Sincerely,

John L. Donaldson, Manager
Laboratory Accreditation

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

1989

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

3417

Robert Maxfield
Versar Inc.
6850 Versar Center
Springfield, VA 22151

SUBJECT: EPA Interim Laboratory Accreditation for Laboratories Which Offer Analysis of Bulk Samples for Asbestos

Dear Laboratory Director:

The U.S. Environmental Protection Agency (EPA) has completed its review of the results of the second round of analyses in the EPA "Interim Asbestos Bulk Sample Analysis Quality Assurance Program." I am pleased to inform you that your laboratory has successfully classified each of four bulk samples submitted to your facility as either asbestos-containing or nonasbestos-containing. Since each sample was correctly classified, a status of "accredited" has been assigned to your laboratory. As you are aware, each laboratory is also given a numerical score which does not affect your accredited status. The numerical score reflects your laboratory's performance in determining the quantity and type of asbestos in the asbestos-containing samples. Your laboratory's score is 100 %.

As announced in the FEDERAL REGISTER of March 29, 1988 (see enclosed copy), the second round of the EPA Interim Program is the last planned round of EPA accreditation. Laboratories which are accredited in the second round of this program will be considered accredited until January 12, 1989. The National Bureau of Standards (NBS) will begin formal operation of the National Voluntary Laboratory Accreditation Program (NVLAP) for laboratories which conduct analyses of bulk samples for asbestos by polarized light microscopy (PLM) in October 1988. Applications for participation in this program are currently being accepted. You may contact Dr. Larry Gallowin of NBS at (301)975-4022 for enrollment information. An exception to the EPA deadline of January 12, 1989 has been made for laboratories which are accredited in the second EPA round and have enrolled in the NBS program by September 30, 1988. These laboratories will be considered accredited by EPA until NBS has completed its first

evaluation of an individual laboratory's performance. The enclosed copy of the FEDERAL REGISTER notice details the period of transition from EPA accreditation to NBS accreditation. Please note that a laboratory currently accredited by EPA must enter the NBS program and receive accreditation from NBS to continue analysis of bulk samples from school buildings.

Should you have any questions regarding the current EPA round of accreditation, you may contact Bruce Harvey of Research Triangle Institute at (919) 541-6369. Thank you for your participation in the program.

Sincerely,

Martin P. Halper, Director
Exposure Evaluation Division (TS-798)

Enclosure

ASBESTOS BULK SAMPLE ANALYSIS INTERIM ACCREDITATION PROGRAM
RESULTS OF ROUND10
JUNE 20, 1988

Robert Mayfield
Versar Inc
6850 Versar Center
Springfield, VA 22151

(703) 642 6.55

LABORATORY
I D NUMBER
3417

QUALITATIVE PERFORMANCE RATING: 4/4
FALSE NEGATIVES: 0
FALSE POSITIVES: 0
IDENTIFICATION RATING: 4/4
QUANTITATIVE RATING: 4/4
RAW SCORE: 400

LABORATORY IS ACCREDITED

LOT & SAMPLE I D NUMBER	A) 7814	B) 2229	C) 8631	D) 8342
RESULTS FROM LABORATORY NUMBER 3417				
ASBESTOS (%)	37 0 CHRY	34 0 AMOS	57 0 CHRY	48 0 CHRY
OTHER FIBROUS MATERIAL (%)	42 0 CELL	50 0 FBGL	38.0 OTHR	1.0 CELL
NONFIBROUS MATERIAL (%)	21 0 NF	16.0 NF	5 0 NF	51 0 NF
RESULTS FROM REFERENCE LABORATORIES				
ASBESTOS (%)	45 3 CHRY	35 3 AMOS	67.0 CHRY	46 8 CHRY
	0 0 NONE	0 1 CROC	0 0 NONE	0.0 NONE
TOTAL ASBESTOS (%)	45 3	35 4	67.0	46.8
DOMINANT ASBESTOS TYPE	CHRY	AMOS	CHRY	CHRY
STANDARD DEVIATION	15 59	10 62	15.32	17.02
ACCEPTANCE RANGE	16 3-100	7 3-63 4	26.6-100	1.8-91.7
OTHER FIBROUS MATERIAL	CELL	FBGL	SYNT	CELL
	FBGL	CELL	CELL	FBGL
NONFIBROUS MATERIAL	BIND	NONE	BIND	CACO
SUMMARY OF QUANTITATIVE RESULTS				
PERCENT ASBESTOS-PERCENTILES				
50% - MEDIAN (N=1E3)	40 0	30.0	74 0	45.0
100% - MAXIMUM	100 0	99.0	100.0	95.0
95%	75 0	60 0	98.8	60.0
75%	50 0	40 0	88 0	60 0
25%	30 0	20.0	58.8	30.9
5%	15.0	7 5	40 0	13.9
0% - MINIMUM	0.0	0.0	0.0	0.0
PERCENT OTHER FIBROUS MATERIAL				
OFM - MEDIAN (N)	40 0(970)	60.0(974)	27.0(896)	5 0(342)
PERCENT NONFIBROUS MATERIAL				
NF - MEDIAN (N)	16 5(804)		5.0(294)	50.0(940)

ASBESTOS ABBREVIATIONS
AMOS=AMOSITE CHRY=CHRYSOTILE CROC=CROCIDOLITE
OTHER FIBROUS MATERIAL ABBREVIATIONS
CELL=CELLULOSE FBGL=FIBROUS GLASS SYNT=SYNTHETIC FIBERS OTHR=OTHER
NONFIBROUS MATERIAL ABBREVIATIONS
BIND=BINDER CACO=CALCIUM CARBONATE

Versar INC.

MEMORANDUM

To: Larry Davies Date: 3/31/89

From: Marcie Wilson

Subject: Asbestos Lab Personnel Who Have Analyzed Samples for Project 5013

NAME	INITIALS	SIGNATURE
Marcie Wilson	MW	MWilson
Michael Lucas		M. Lucas
Ronald Martin	RM	RMartin
Barbara Clements	BC	B Clements
Traci Hartsell	th	T. Hartsell
Timothy Perkins	TAP	Timothy A. Perkins
Donna Southard	ds	dSouthard
Joe Swofford	JS	JSwofford

The field bulk sample numbers consist of four character groups and have the following general format:

PSXXX-00A-00B-INT
Character Group = (1) (2) (3) (4)

1. The first character group represents the school or building number assigned by Baltimore City:

   PS = Public School
   XXX = School or building number; leading zeros are not significant (e.g., PS40 is equivalent to PS040).

2. The second character group represents locations within the building assigned at the discretion of the inspector; leading zeros are not significant (e.g., 004 = 04 = 4).

3. The third character group represents the numbered series of samples within a location assigned at the discretion of the inspector; leading zeros are not significant (e.g., 001 = 01 = 1).

4. The fourth character group represents the inspector's initials; its use is optional.

Therefore, the following sample numbers are equivalent and may represent the same sample:

PS40-01-01-LGD
PS040-1-1-LGD
PS040-001-001

LABORATORY ANALYSIS DATE
FOR PS221

BATCH NO. *	ANALYSIS DATE
615	2/04/88
616	2/03/88
617	2/04/88

* BATCH NUMBER IS PROVIDED ON EACH LABORATORY ANAYSIS DATA SHEET IN THE UPPER RIGHT CORNER, THIRD LINE FROM THE TOP.

Versar INC.

SAMPLE #: ASB88-02183

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: PS221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 616

CLIENT: BALTIMORE

FIELD SAMPLE #: PS221-001 -001-LS MATRIX: BULK

DATES:
RECEIVED: 2/3 /88 COLLECTED: 2/2 /88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION:
FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT

Chrysotile	35-40 %
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT

[CELLULOSE]	10 %
[FIBROUS GLASS]	10-15 %
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 35-40 %

TOTAL PERCENT ASBESTOS: 35-40 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

Marcie L. Wilson
Asbestos Laboratory
Manager

R Martin
Asbestos Analyst

6850 VERSAR CENTER • P.O. BOX 1549 • SPRINGFIELD, VIRGINIA 22151 • TELEPHONE: (703) 750-3000 • TELEX: 901125

Versar INC.

SAMPLE #: ASB88-02184

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: PS221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 616

CLIENT: BALTIMORE

FIELD SAMPLE #: PS221-001 -002-LS MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION:
FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Gray

ASBESTOS CONTENT

Chrysotile	30-35 %
Amosite	1-5 %
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT

[CELLULOSE]	%
[FIBROUS GLASS]	10-15 %
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 40-45 %

TOTAL PERCENT ASBESTOS: 31-40 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

Marcie L. Wilson
Asbestos Laboratory
Manager

RM
Asbestos Analyst

6850 VERSAR CENTER • P.O. BOX 1549 • SPRINGFIELD, VIRGINIA 22151 • TELEPHONE: (703) 750-3000 • TELEX: 901125

Versar INC.

SAMPLE #: ASB88-02185

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: P5221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 616

CLIENT: BALTIMORE

FIELD SAMPLE #: P5221-001 -003-L5 MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION: FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT		NON-ASBESTOS/FIBROUS CONTENT	
Chrysotile	50-55 %	[CELLULOSE]	%
Amosite	%	[FIBROUS GLASS]	1-5 %
Crocidolite	%	[SYNTH. POLYMER]	%
Tremolite	%	[ ]	%
Actinolite	%	[ ]	%
Anthophyllite	%		

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 35-40 %

TOTAL PERCENT ASBESTOS: 50-55 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

Marcie L. Wilson
Asbestos Laboratory
Manager

RM
Asbestos Analyst

6850 VERSAR CENTER • P.O. BOX 1549 • SPRINGFIELD, VIRGINIA 22151 • TELEPHONE: (703) 750-3000 • TELEX: 901125

Versar INC.

SAMPLE #: ASB88- 02186

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: DS 221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 616

CLIENT: BALTIMORE

FIELD SAMPLE #: DS221-001-004 LS MATRIX: BULK

DATES:
RECEIVED: 2 /13 /88 COLLECTED: 2 / 2 /88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION:
FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT

Chrysotile	15-20 %
Amosite	30-35 %
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT

[CELLULOSE]	5 %
[FIBROUS GLASS]	5-10 %
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 30-35 %

TOTAL PERCENT ASBESTOS: 45-55 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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Asbestos Analyst

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Versar INC.

SAMPLE #: ASB88-02187

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: PS221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 616

CLIENT: BALTIMORE

FIELD SAMPLE #: PS221-001 -005 -LS MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION:
FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT	
Chrysotile	%
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT	
[CELLULOSE]	1-5 %
[FIBROUS GLASS]	30-35 %
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT	
[BIND. MATERIAL]	55-60 %

TOTAL PERCENT ASBESTOS: <1 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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Versar INC.

SAMPLE #: AS888-02188

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: PS221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 616

CLIENT: BALTIMORE

FIELD SAMPLE #: PS221-001 -006 -45 MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION:
FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT

Chrysotile	1-5 %
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT

[CELLULOSE]	1-5 %
[FIBROUS GLASS]	40-45 %
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL]	40-45 %

TOTAL PERCENT ASBESTOS: 1-5 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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Versar INC.

SAMPLE #: ASB88-02189

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: PS221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 616

CLIENT: BALTIMORE

FIELD SAMPLE #: PS221-001 -007-LS MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION: FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT

Chrysotile	1-5 %
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT

[CELLULOSE]	1-5 %
[FIBROUS GLASS]	40-45 %
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 40-45 %

TOTAL PERCENT ASBESTOS: 1-5 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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Versar INC.

SAMPLE #: ASB88-02190

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: PS221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 6116

CLIENT: BALTIMORE

FIELD SAMPLE #: PS221-001 -008 -LS MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION:
FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Gray

ASBESTOS CONTENT

Chrysotile	%
Amosite	15-20 %
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT

[CELLULOSE]	5 %
[FIBROUS GLASS]	%
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 70-75 %

TOTAL PERCENT ASBESTOS: 15-20 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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Versar INC.

SAMPLE #: AS888-02191

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: PS221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 6016

CLIENT: BALTIMORE

FIELD SAMPLE #: PS221-001 -009 -LS MATRIX: BULK

DATES:

RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION:

FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Gray

ASBESTOS CONTENT		NON-ASBESTOS/FIBROUS CONTENT	
Chrysotile	%	[CELLULOSE]	1-5 %
Amosite	%	[FIBROUS GLASS]	45-50 %
Crocidolite	%	[SYNTH. POLYMER]	%
Tremolite	%	[ ]	%
Actinolite	%	[ ]	%
Anthophyllite	%		

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 40-45 %

TOTAL PERCENT ASBESTOS: <1 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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Versar INC.

SAMPLE #: ASB88-02192

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: PS221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 616

CLIENT: BALTIMORE

FIELD SAMPLE #: PS221-002-001-LS MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION: FRIABLE [X] FIBROUS [X] HOMOGENOUS [Y]

COLOR/APPEARANCE: Gray

ASBESTOS CONTENT

Chrysotile	%
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT

[CELLULOSE]	%
[FIBROUS GLASS]	45-50 %
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL]	45-50 %

TOTAL PERCENT ASBESTOS: <1 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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SAMPLE #: ASB88-02193

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: PS221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 616

CLIENT: BALTIMORE

FIELD SAMPLE #: PS221-002-002-LS MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION: FRIABLE [X] FIBROUS [X] HOMOGENOUS [ ]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT	
Chrysotile	%
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT	
[CELLULOSE]	1-5 %
[FIBROUS GLASS]	45-50 %
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT	
[BIND. MATERIAL]	40-45 %

TOTAL PERCENT ASBESTOS: <1 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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SAMPLE #: ASB88-02194

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: PS221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 616

CLIENT: BALTIMORE

FIELD SAMPLE #: PS221-002-003-LS MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION:
FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan/White

ASBESTOS CONTENT	
Chrysotile	15-20 %
Amosite	15-20 %
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT	
[CELLULOSE]	1-5 %
[FIBROUS GLASS]	%
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT	
[BIND. MATERIAL]	50-55 %

TOTAL PERCENT ASBESTOS: 30-40 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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SAMPLE #: ASB88-02171

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: P5221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 615

CLIENT: BALTIMORE

FIELD SAMPLE #: P5221-002-004-L5 MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION: FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT

Chrysotile	1-5 %
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT

[CELLULOSE]	1-5 %
[FIBROUS GLASS]	45-50 %
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 35-40 %

TOTAL PERCENT ASBESTOS: 1-5 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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Versar INC.

SAMPLE #: ASB88- 02172

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: PS221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 615

CLIENT: BALTIMORE

FIELD SAMPLE #: PS221-002-005-LS MATRIX: BULK

DATES: RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION: FRIABLE [ ] FIBROUS [ ] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT

Chrysotile	1-5 %
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT

[CELLULOSE]	%
[FIBROUS GLASS]	%
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 90-95 %

TOTAL PERCENT ASBESTOS: 1-5 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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SAMPLE #: ASB88- 02173

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: P5221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 615

CLIENT: BALTIMORE

FIELD SAMPLE #: P5221-002-006-L5 MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION:
FRIABLE [ ] FIBROUS [ ] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT

Chrysotile	1-5 %
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT

[CELLULOSE]	%
[FIBROUS GLASS]	%
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 90-95 %

TOTAL PERCENT ASBESTOS: 1-5 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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Versar INC.

SAMPLE #: ASB88- 02174

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: P5221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 615

CLIENT: BALTIMORE

FIELD SAMPLE #: P5221-002-007-LS MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION:
FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT

Chrysotile	____ %
Amosite	____ %
Crocidolite	____ %
Tremolite	____ %
Actinolite	____ %
Anthophyllite	____ %

NON-ASBESTOS/FIBROUS CONTENT

[CELLULOSE]	30-35 %
[FIBROUS GLASS]	45-50 %
[SYNTH. POLYMER]	____ %
[____]	____ %
[____]	____ %

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL]	10-15 %

TOTAL PERCENT ASBESTOS: <1 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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Versar INC.

SAMPLE #: ASB88-02175

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: P5221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 615

CLIENT: BALTIMORE

FIELD SAMPLE #: P5221-002-008-L5 MATRIX: BULK

DATES: RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION: FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT	
Chrysotile	%
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT	
[CELLULOSE]	30-35 %
[FIBROUS GLASS]	45-50 %
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT	
[BIND. MATERIAL]	10-15 %

TOTAL PERCENT ASBESTOS: <1 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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SAMPLE #: ASB88- 02176

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: P5221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 615

CLIENT: BALTIMORE

FIELD SAMPLE #: P5221-002-009-L5 MATRIX: BULK

DATES: RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION: FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT	
Chrysotile	%
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT	
[CELLULOSE]	30-35 %
[FIBROUS GLASS]	45-50 %
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT	
[BIND. MATERIAL]	10-15 %

TOTAL PERCENT ASBESTOS: 4/ %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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Versar INC.

SAMPLE #: ASB88-021077

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: P5221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 615

CLIENT: BALTIMORE

FIELD SAMPLE #: P5221-003-001-LS MATRIX: BULK

DATES: RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION: FRIABLE [ ] FIBROUS [ ] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT

Chrysotile	1-5 %
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT

[CELLULOSE]	%
[FIBROUS GLASS]	%
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 90-95 %

TOTAL PERCENT ASBESTOS: 1-5 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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SAMPLE #: ASB88- 02178

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: P5221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 615

CLIENT: BALTIMORE

FIELD SAMPLE #: P5221-003-002-LS MATRIX: BULK

DATES: RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION: FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT	
Chrysotile	%
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT	
[CELLULOSE]	1-5 %
[FIBROUS GLASS]	85-90 %
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT	
[BIND. MATERIAL]	1-5 %

TOTAL PERCENT ASBESTOS: <1 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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Versar INC.

SAMPLE #: ASB88- 02179

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: PS221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 615

CLIENT: BALTIMORE

FIELD SAMPLE #: PS221-003-003 LS MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION:
FRIABLE [✓] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT		NON-ASBESTOS/FIBROUS CONTENT	
Chrysotile	____ %	[CELLULOSE]	1-5 %
Amosite	____ %	[FIBROUS GLASS]	75 80 %
Crocidolite	____ %	[SYNTH. POLYMER]	____ %
Tremolite	____ %	[____]	____ %
Actinolite	____ %	[____]	____ %
Anthophyllite	____ %		

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 10-15 %

TOTAL PERCENT ASBESTOS: <1 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

Marcie L. Wilson
Asbestos Laboratory
Manager

B. Clements
Asbestos Analyst

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Versar INC.

SAMPLE #: ASB88- 02180

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: PS221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 615

CLIENT: BALTIMORE

FIELD SAMPLE #: PS22L-003-004-45 MATRIX: BULK

DATES:

RECEIVED: 2 /3 /88 COLLECTED: 2 / 2 /88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION:

FRIABLE [ ] FIBROUS [ ] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT		NON-ASBESTOS/FIBROUS CONTENT	
Chrysotile	1-5 %	[CELLULOSE]	%
Amosite	%	[FIBROUS GLASS]	%
Crocidolite	%	[SYNTH. POLYMER]	%
Tremolite	%	[ ]	%
Actinolite	%	[ ]	%
Anthophyllite	%		

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 90-95 %

TOTAL PERCENT ASBESTOS: 1-5 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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Versar INC.

SAMPLE #: ASB88-02181

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: P5221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 615

CLIENT: BALTIMORE

FIELD SAMPLE #: P5221-004-001-LS MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION: FRIABLE [X] FIBROUS [X] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT

Chrysotile	%
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT

[CELLULOSE]	1-5 %
[FIBROUS GLASS]	75-80 %
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 10-15 %

TOTAL PERCENT ASBESTOS: <1 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

Marcie L. Wilson
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Versar INC.

SAMPLE #: ASB88- 02182

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: P5221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 615

CLIENT: BALTIMORE

FIELD SAMPLE #: P5221-004-002-LS MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION: FRIABLE [ ] FIBROUS [ ] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT

Chrysotile	1-5 %
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT

[CELLULOSE]	%
[FIBROUS GLASS]	%
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 90-95 %

TOTAL PERCENT ASBESTOS: 1-5 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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Manager

B. Clements
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Versar INC.

SAMPLE #: ASB88-02195

LABORATORY REPORT - BULK ASBESTOS ANALYSIS

SITE: P5221

PROJECT NUMBER: 6013 . 8 . 2 BATCH #: 617

CLIENT: BALTIMORE

FIELD SAMPLE #: P5221-004-003-LS MATRIX: BULK

DATES:
RECEIVED: 2/3/88 COLLECTED: 2/2/88 REPORTED: / /88

LOCATION:

GROSS DESCRIPTION: FRIABLE [ ] FIBROUS [ ] HOMOGENOUS [X]

COLOR/APPEARANCE: Tan

ASBESTOS CONTENT

Chrysotile	1-5 %
Amosite	%
Crocidolite	%
Tremolite	%
Actinolite	%
Anthophyllite	%

NON-ASBESTOS/FIBROUS CONTENT

[CELLULOSE]	%
[FIBROUS GLASS]	%
[SYNTH. POLYMER]	%
[ ]	%
[ ]	%

NON-ASBESTOS/NON-FIBROUS CONTENT

[BIND. MATERIAL] 90-95 %

TOTAL PERCENT ASBESTOS: 1-5 %

COMMENTS

DESCRIPTION OF ANALYSIS: Bulk Asbestos samples are analyzed by trained microscopists, using Polarized Light Microscopy with dispersion staining. Analysts are trained by EPA McCrone Research Institute utilizing the EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples, EPA-600/M4-82-020.

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Versar INC.

APPENDIX B

FINAL RULE FOR ASBESTOS-CONTAINING MATERIALS IN SCHOOLS: 40 CFR 763

Excerpts

federal register

Friday
October 30, 1987

PARTIAL COPY

Part III

Environmental Protection Agency

40 CFR Part 763

Asbestos-Containing Materials in Schools; Final Rule and Notice

PARTIAL COPY

VI. References

1. USEPA. "Guidance for Controlling Asbestos-Containing Materials in Buildings," EPA 560/5–85–024, June 1985.

2. USEPA. "A Guide to Respiratory Protection for the Asbestos Abatement Industry," EPA 560/OPTS–86–001, September 1986.

3. USEPA. "Asbestos in Buildings: Simplified Sampling Scheme for Friable Surfacing Materials," EPA 560/5–85–030a, October 1985.

4. USEPA. Friable Asbestos-Containing Materials in Schools, 40 CFR Part 763, Subpart F.

5. USEPA. National Emission Standards for Hazardous Air Pollutants, 40 CFR Part 61, Subpart M.

6. USDOL. OSHA. Occupational Exposure to Asbestos, 29 CFR 1926.58.

7. USEPA. Toxic Substances: Asbestos Abatement Projects, 40 CFR Part 763, Subpart G.

VII. Regulatory Assessment Requirements

A. Executive Order 12291

Under Executive Order 12291, EPA has determined that this rule is a "major" rule and has developed a Regulatory Impact Analysis. EPA has prepared an economic impact analysis of the TSCA Title II regulations.

B. Regulatory Flexibility Act

EPA has analyzed the economic impact of this rule on small businesses. EPA's analysis of the economic consequences of this rule appears in Unit IV.

C. Paperwork Reduction Act

The reporting and recordkeeping provisions in this rule have been approved by the Office of Management and Budget (OMB) under the Paperwork Reduction Act, and has been assigned OMB control number 2070–0091.

List of Subjects in 40 CFR Part 763

Asbestos, Environmental protection, Hazardous substances, Incorporation by reference, Occupational health and safety, Recordkeeping, Schools.

Dated: October 17, 1987.

Lee M. Thomas,

Administrator.

Therefore, 40 CFR Part 763 is amended as follows:

PART 763—[AMENDED]

1. The authority citation for Part 763 continues to read as follows:

Authority: 15 U.S.C. 2605 and 2607(c). Subpart E also issued under 15 U.S.C. 2641, 2643, 2646, and 2647.

2. By adding §§ 763.80 through 763.99 and Appendices A, B, and D to Subpart E to read as follows:

Subpart E—Asbestos-Containing Materials in Schools

Sec.

§ 763.80 Scope and purpose.

(a) This rule requires local education agencies to identify friable and nonfriable asbestos-containing material (ACM) in public and private elementary and secondary schools by visually inspecting school buildings for such materials, sampling such materials if they are not assumed to be ACM, and having samples analyzed by appropriate techniques referred to in this rule. The rule requires local education agencies to submit management plans to the Governor of their State by October 12, 1988, begin to implement the plans by July 9, 1989, and complete implementation of the plans in a timely fashion. In addition, local education agencies are required to use persons who have been accredited to conduct inspections, reinspections, develop management plans, or perform response actions. The rule also includes recordkeeping requirements. Local education agencies may contractually delegate their duties under this rule, but they remain responsible for the proper performance of those duties. Local education agencies are encouraged to consult with EPA Regional Asbestos Coordinators, or if applicable, a State's lead agency designated by the State Governor, for assistance in complying with this rule.

(b) Local education agencies must provide for the transportation and disposal of asbestos in accordance with EPA's "Asbestos Waste Management Guidance." For convenience, applicable sections of this guidance are reprinted as Appendix D of this subpart. There are regulations in place, however, that affect transportation and disposal of asbestos waste generated by this rule. The transportation of asbestos waste is covered by the Department of Transportation (49 CFR Part 173, Subpart J) and disposal is covered by the National Emissions Standards for Hazardous Air Pollutants (NESHAP) (40 CFR Part 61, Subpart M).

§ 763.83 Definitions.

For purposes of this subpart:

"Act" means the Toxic Substances Control Act (TSCA), 15 U.S.C. 2601, *et seq.*

"Accessible" when referring to ACM means that the material is subject to disturbance by school building occupants or custodial or maintenance personnel in the course of their normal activities.

"Accredited" or "accreditation" when referring to a person or laboratory means that such person or laboratory is accredited in accordance with section 206 of Title II of the Act.

"Air erosion" means the passage of air over friable ACBM which may result in the release of asbestos fibers.

"Asbestos" means the asbestiform varieties of: Chrysotile (serpentine); crocidolite (riebeckite); amosite (cummingtonitegrunerite); anthophyllite; tremolite; and actinolite.

"Asbestos-containing material" (ACM) when referring to school buildings means any material or product which contains more than 1 percent asbestos.

"Asbestos-containing building material" (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a school building.

"Asbestos debris" means 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.

"Damaged friable miscellaneous ACM" means friable miscellaneous ACM which has deteriorated or sustained physical injury such that the internal structure (cohesion) of the material is inadequate or, if applicable, which has delaminated such that its bond to the substrate (adhesion) is

inadequate or which for any other reason lacks fiber cohesion or adhesion qualities. Such damage or deterioration may be illustrated by the separation of ACM into layers; separation of ACM from the substrate; flaking, blistering, or crumbling of the ACM surface; water damage; significant or repeated water stains, scrapes, gouges, mars or other signs of physical injury on the ACM. Asbestos debris originating from the ACBM in question may also indicate damage.

"Damaged friable surfacing ACM" means friable surfacing ACM which has deteriorated or sustained physical injury such that the internal structure (cohesion) of the material is inadequate or which has delaminated such that its bond to the substrate (adhesion) is inadequate, or which, for any other reason, lacks fiber cohesion or adhesion qualities. Such damage or deterioration may be illustrated by the separation of ACM into layers; separation of ACM from the substrate; flaking, blistering, or crumbling of the ACM surface; water damage; significant or repeated water stains, scrapes, gouges, mars or other signs of physical injury on the ACM. Asbestos debris originating from the ACBM in question may also indicate damage.

"Damaged or significantly damaged thermal system insulation ACM" means thermal system insulation ACM on pipes, boilers, tanks, ducts, and other thermal system insulation equipment where the insulation has lost its structural integrity, or its covering, in whole or in part, is crushed, water-stained, gouged, punctured, missing, or not intact such that it is not able to contain fibers. Damage may be further illustrated by occasional punctures, gouges or other signs of physical injury to ACM; occasional water damage on the protective coverings/jackets; or exposed ACM ends or joints. Asbestos debris originating from the ACBM in question may also indicate damage.

"Encapsulation" means the treatment of ACBM with a material that surrounds or embeds asbestos fibers in an adhesive matrix to prevent the release of fibers, as the encapsulant creates a membrane over the surface (bridging encapsulant) or penetrates the material and binds its components together (penetrating encapsulant).

"Enclosure" means an airtight, impermeable, permanent barrier around ACBM to prevent the release of asbestos fibers into the air.

"Fiber release episode" means any uncontrolled or unintentional disturbance of ACBM resulting in visible emission.

"Friable" when referring to material in a school building means that the material, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure, and includes previously nonfriable material after such previously nonfriable material becomes damaged to the extent that when dry it may be crumbled, pulverized, or reduced to powder by hand pressure.

"Functional space" means a room, group of rooms, or homogeneous area (including crawl spaces or the space between a dropped ceiling and the floor or roof deck above), such as classroom(s), a cafeteria, gymnasium, hallway(s), designated by a person accredited to prepare management plans, design abatement projects, or conduct response actions.

"High-efficiency particulate air" (HEPA) refers to a filtering system capable of trapping and retaining at least 99.97 percent of all monodispersed particles 0.3 μm in diameter or larger.

"Homogeneous area" means an area of surfacing material, thermal system insulation material, or miscellaneous material that is uniform in color and texture.

"Local education agency" means:

(1) Any local educational agency as defined in section 198 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 3381).

(2) The owner of any nonpublic, nonprofit elementary, or secondary school building.

(3) The governing authority of any school operated under the defense dependents' education system provided for under the Defense Dependents' Education Act of 1978 (20 U.S.C. 921, et seq.).

"Miscellaneous ACM" means miscellaneous material that is ACM in a school building.

"Miscellaneous material" means interior building material on structural components, structural members or fixtures, such as floor and ceiling tiles, and does not include surfacing material or thermal system insulation.

"Nonfriable" means material in a school building which when dry may not be crumbled, pulverized, or reduced to powder by hand pressure.

"Operations and maintenance program" means a program of work practices to maintain friable ACBM in good condition, ensure clean up of asbestos fibers previously released, and prevent further release by minimizing and controlling friable ACBM disturbance or damage.

"Potential damage" means circumstances in which:

(1) Friable ACBM is in an area regularly used by building occupants, including maintenance personnel, in the course of their normal activities.

(2) There are indications that there is a reasonable likelihood that the material or its covering will become damaged, deteriorated, or delaminated due to factors such as changes in building use, changes in operations and maintenance practices, changes in occupancy, or recurrent damage.

"Potential significant damage" means circumstances in which:

(1) Friable ACBM is in an area regularly used by building occupants, including maintenance personnel, in the course of their normal activities.

(2) There are indications that there is a reasonable likelihood that the material or its covering will become significantly damaged, deteriorated, or delaminated due to factors such as changes in building use, changes in operations and maintenance practices, changes in occupancy, or recurrent damage.

(3) The material is subject to major or continuing disturbance, due to factors including, but not limited to, accessibility or, under certain circumstances, vibration or air erosion.

"Preventive measures" means actions taken to reduce disturbance of ACBM or otherwise eliminate the reasonable likelihood of the material's becoming damaged or significantly damaged.

"Removal" means the taking out or the stripping of substantially all ACBM from a damaged area, a functional space, or a homogeneous area in a school building.

"Repair" means returning damaged ACBM to an undamaged condition or to an intact state so as to prevent fiber release.

"Response action" means a method, including removal, encapsulation, enclosure, repair, operations and maintenance, that protects human health and the environment from friable ACBM.

"Routine maintenance area" means an area, such as a boiler room or mechanical room, that is not normally frequented by students and in which maintenance employees or contract workers regularly conduct maintenance activities.

"School" means any elementary or secondary school as defined in section 198 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 2854).

"School building" means:

(1) Any structure suitable for use as a classroom, including a school facility such as a laboratory, library, school eating facility, or facility used for the preparation of food.

(2) Any gymnasium or other facility which is specially designed for athletic

or recreational activities for an academic course in physical education.

(3) Any other facility used for the instruction or housing of students or for the administration of educational or research programs.

(4) Any maintenance, storage, or utility facility, including any hallway, essential to the operation of any facility described in this definition of "school building" under paragraphs (1), (2), or (3).

(5) Any portico or covered exterior hallway or walkway.

(6) Any exterior portion of a mechanical system used to condition interior space.

"Significantly damaged friable miscellaneous ACM" means damaged friable miscellaneous ACM where the damage is extensive and severe.

"Significantly damaged friable surfacing ACM" means damaged friable surfacing ACM in a functional space where the damage is extensive and severe.

"State" means a State, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the Northern Marianas, the Trust Territory of the Pacific Islands, and the Virgin Islands.

"Surfacing ACM" means surfacing material that is ACM.

"Surfacing material" means material in a school building that is sprayed-on, 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, or other purposes.

"Thermal system insulation" means material in a school building applied to pipes, fittings, boilers, breeching, tanks, ducts, or other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.

"Thermal system insulation ACM" means thermal system insulation that is ACM.

"Vibration" means the periodic motion of friable ACBM which may result in the release of asbestos fibers.

§ 763.84 General local education agency responsibilities.

Each local education agency shall:

(a) Ensure that the activities of any persons who perform inspections, reinspections, and periodic surveillance, develop and update management plans, and develop and implement response actions, including operations and maintenance, are carried out in accordance with Subpart E of this part.

(b) Ensure that all custodial and maintenance employees are properly trained as required by this Subpart E and other applicable Federal and/or State regulations (e.g., the Occupational Safety and Health Administration asbestos standard for construction, the EPA worker protection rule, or applicable State regulations).

(c) Ensure that workers and building occupants, or their legal guardians, are informed at least once each school year about inspections, response actions, and post-response action activities, including periodic reinspection and surveillance activities that are planned or in progress.

(d) Ensure that short-term workers (e.g., telephone repair workers, utility workers, or exterminators) who may come in contact with asbestos in a school are provided information regarding the locations of ACBM and suspected ACBM assumed to be ACM.

(e) Ensure that warning labels are posted in accordance with § 763.95.

(f) Ensure that management plans are available for inspection and notification of such availability has been provided as specified in the management plan under § 763.93(g).

(g)(1) Designate a person to ensure that requirements under this section are properly implemented.

(2) Ensure that the designated person receives adequate training to perform duties assigned under this section. Such training shall provide, as necessary, basic knowledge of:

(i) Health effects of asbestos.

(ii) Detection, identification, and assessment of ACM.

(iii) Options for controlling ACBM.

(iv) Asbestos management programs.

(v) Relevant Federal and State regulations concerning asbestos, including those in this Subpart E and those of the Occupational Safety and Health Administration, U.S. Department of Labor, the U.S. Department of Transportation and the U.S. Environmental Protection Agency.

(h) Consider whether any conflict of interest may arise from the interrelationship among accredited personnel and whether that should influence the selection of accredited personnel to perform activities under this subpart.

§ 763.85 Inspection and reinspections.

(a) *Inspection.* (1) Except as provided in paragraph (a)(2) of this section, before October 12, 1988, local education agencies shall inspect each school building that they lease, own, or otherwise use as a school building to identify all locations of friable and nonfriable ACBM.

(2) Any building leased or acquired on or after October 12, 1988, that is to be used as a school building shall be inspected as described under paragraphs (a) (3) and (4) of this section prior to use as a school building. In the event that emergency use of an uninspected building as a school building is necessitated, such buildings shall be inspected within 30 days after commencement of such use.

(3) Each inspection shall be made by an accredited inspector.

(4) For each area of a school building, except as excluded under § 763.99, each person performing an inspection shall:

(i) Visually inspect the area to identify the locations of all suspected ACBM.

(ii) Touch all suspected ACBM to determine whether they are friable.

(iii) Identify all homogeneous areas of friable suspected ACBM and all homogeneous areas of nonfriable suspected ACBM.

(iv) Assume that some or all of the homogeneous areas are ACM, and, for each homogeneous area that is not assumed to be ACM, collect and submit for analysis bulk samples under §§ 763.86 and 763.87.

(v) Assess, under § 763.88, friable material in areas where samples are collected, friable material in areas that are assumed to be ACBM, and friable ACBM identified during a previous inspection.

(vi) Record the following and submit to the person designated under § 763.84 a copy of such record for inclusion in the management plan within 30 days of the inspection:

(A) An inspection report with the date of the inspection signed by each accredited person making the inspection, State of accreditation, and if applicable, his or her accreditation number.

(B) An inventory of the locations of the homogeneous areas where samples are collected, exact location where each bulk sample is collected, dates that samples are collected, homogeneous areas where friable suspected ACBM is assumed to be ACM, and homogeneous areas where nonfriable suspected ACBM is assumed to be ACM.

(C) A description of the manner used to determine sampling locations, the name and signature of each accredited inspector who collected the samples, State of accreditation, and, if applicable, his or her accreditation number.

(D) A list of whether the homogeneous areas identified under paragraph (a)(4)(vi)(B) of this section are surfacing material, thermal system insulation, or miscellaneous material.

(E) Assessments made of friable material, the name and signature of each accredited inspector making the

assessment, State of accreditation, and if applicable, his or her accreditation number.

(b) *Reinspection.* (1) At least once every 3 years after a management plan is in effect, each local education agency shall conduct a reinspection of all friable and nonfriable known or assumed ACBM in each school building that they lease, own, or otherwise use as a school building.

(2) Each inspection shall be made by an accredited inspector.

(3) For each area of a school building, each person performing a reinspection shall:

(i) Visually reinspect, and reassess, under § 763.88, the condition of all friable known or assumed ACBM.

(ii) Visually inspect material that was previously considered nonfriable ACBM and touch the material to determine whether it has become friable since the last inspection or reinspection.

(iii) Identify any homogeneous areas with material that has become friable since the last inspection or reinspection.

(iv) For each homogeneous area of newly friable material that is already assumed to be ACBM, bulk samples may be collected and submitted for analysis in accordance with §§ 763.86 and 763.87.

(v) Assess, under § 763.88, the condition of the newly friable material in areas where samples are collected, and newly friable materials in areas that are assumed to be ACBM.

(vi) Reassess, under § 763.88, the condition of friable known or assumed ACBM previously identified.

(vii) Record the following and submit to the person designated under § 763.84 a copy of such record for inclusion in the management plan within 30 days of the reinspection:

(A) The date of the reinspection, the name and signature of the person making the reinspection, State of accreditation, and if applicable, his or her accreditation number, and any changes in the condition of known or assumed ACBM.

(B) The exact locations where samples are collected during the reinspection, a description of the manner used to determine sampling locations, the name and signature of each accredited inspector who collected the samples, State of accreditation, and, if applicable, his or her accreditation number.

(C) Any assessments or reassessments made of friable material, the name and signature of the accredited inspector making the assessments, State of accreditation, and if applicable, his or her accreditation number.

(c) *General.* Thermal system insulation that has retained its structural integrity and that has an undamaged protective jacket or wrap that prevents fiber release shall be treated as nonfriable and therefore is subject only to periodic surveillance and preventive measures as necessary.

§ 763.86 Sampling.

(a) *Surfacing material.* An accredited inspector shall collect, in a statistically random manner that is representative of the homogeneous area, bulk samples from each homogeneous area of friable surfacing material that is not assumed to be ACM, and shall collect the samples as follows:

(1) At least three bulk samples shall be collected from each homogeneous area that is 1,000 ft^2 or less, except as provided in § 763.87(c)(2).

(2) At least five bulk samples shall be collected from each homogeneous area that is greater than 1,000 ft^2 but less than or equal to 5,000 ft^2, except as provided in § 763.87(c)(2).

(3) At least seven bulk samples shall be collected from each homogeneous area that is greater than 5,000 ft^2, except as provided in § 763.87(c)(2).

(b) *Thermal system insulation.* (1) Except as provided in paragraphs (b) (2) through (4) of this section and § 763.87(c), an accredited inspector shall collect, in a randomly distributed manner, at least three bulk samples from each homogeneous area of thermal system insulation that is not assumed to be ACM.

(2) Collect at least one bulk sample from each homogeneous area of patched thermal system insulation that is not assumed to be ACM if the patched section is less than 6 linear or square feet.

(3) In a manner sufficient to determine whether the material is ACM or not ACM, collect bulk samples from each insulated mechanical system that is not assumed to be ACM where cement or plaster is used on fittings such as tees, elbows, or valves, except as provided under § 763.87(c)(2).

(4) Bulk samples are not required to be collected from any homogeneous area where the accredited inspector has determined that the thermal system insulation is fiberglass, foam glass, rubber, or other non-ACBM.

(c) *Miscellaneous material.* In a manner sufficient to determine whether material is ACM or not ACM, an accredited inspector shall collect bulk samples from each homogeneous area of friable miscellaneous material that is not assumed to be ACM.

(d) *Nonfriable suspected ACBM.* If any homogeneous area of nonfriable suspected ACBM is not assumed to be ACM, then an accredited inspector shall collect, in a manner sufficient to determine whether the material is ACM or not ACM, bulk samples from the homogeneous area of nonfriable suspected ACBM that is not assumed to be ACM.

§ 763.87 Analysis.

(a) Local education agencies shall have bulk samples, collected under § 763.86 and submitted for analysis, analyzed for asbestos using laboratories accredited by the National Bureau of Standards (NBS). Local education agencies shall use laboratories which have received interim accreditation for polarized light microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Analysis Quality Assurance Program until the NBS PLM laboratory accreditation program for PLM is operational.

(b) Bulk samples shall not be composited for analysis and shall be analyzed for asbestos content by PLM, using the "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" found at Appendix A to Subpart F in 40 CFR Part 763.

(c)(1) A homogeneous area is considered not to contain ACM only if the results of all samples required to be collected from the area show asbestos in amounts of 1 percent or less.

(2) A homogeneous area shall be determined to contain ACM based on a finding that the results of at least one sample collected from that area shows that asbestos is present in an amount greater than 1 percent.

(d) The name and address of each laboratory performing an analysis, the date of analysis, and the name and signature of the person performing the analysis shall be submitted to the person designated under § 763.84 for inclusion into the management plan within 30 days of the analysis.

§ 763.88 Assessment.

(a)(1) For each inspection and reinspection conducted under § 763.85 (a) and (c) and previous inspections specified under § 763.99, the local education agency shall have an accredited inspector provide a written assessment of all friable known or assumed ACBM in the school building.

(2) Each accredited inspector providing a written assessment shall sign and date the assessment, provide his or her State of accreditation, and if applicable, accreditation number, and submit a copy of the assessment to the person designated under § 763.84 for inclusion in the management plan within 30 days of the assessment.

(b) The inspector shall classify and give reasons in the written assessment for classifying the ACBM and suspected ACBM assumed to be ACM in the school building into one of the following categories:

(1) Damaged or significantly damaged thermal system insulation ACM.

(2) Damaged friable surfacing ACM.

(3) Significantly damaged friable surfacing ACM.

(4) Damaged or significantly damaged friable miscellaneous ACM.

(5) ACBM with potential for damage.

(6) ACBM with potential for significant damage.

(7) Any remaining friable ACBM or friable suspected ACBM.

(c) Assessment may include the following considerations:

(1) Location and the amount of the material, both in total quantity and as a percentage of the functional space.

(2) Condition of the material, specifying:

(i) Type of damage or significant damage (e.g., flaking, blistering, water damage, or other signs of physical damage).

(ii) Severity of damage (e.g., major flaking, severely torn jackets, as opposed to occasional flaking, minor tears to jackets).

(iii) Extent or spread of damage over large areas or large percentages of the homogeneous area.

(3) Whether the material is accessible.

(4) The material's potential for disturbance.

(5) Known or suspected causes of damage or significant damage (e.g., air erosion, vandalism, vibration, water).

(6) Preventive measures which might eliminate the reasonable likelihood of undamaged ACM from becoming significantly damaged.

(d) The local education agency shall select a person accredited to develop management plans to review the results of each inspection, reinspection, and assessment for the school building and to conduct any other necessary activities in order to recommend in writing to the local education agency appropriate response actions. The accredited person shall sign and date the recommendation, provide his or her State of accreditation, and, if applicable, provide his or her accreditation number, and submit a copy of the recommendation to the person designated under § 763.84 for inclusion in the management plan.

§ 763.90 Response actions.

(a) The local education agency shall select and implement in a timely manner the appropriate response actions in this section consistent with the assessment conducted in § 763.88. The response actions selected shall be sufficient to protect human health and the environment. The local education agency may then select, from the response actions which protect human health and the environment, that action which is the least burdensome method. Nothing in this section shall be construed to prohibit removal of ACBM from a school building at any time, should removal be the preferred response action of the local education agency.

(b) If damaged or significantly damaged thermal system insulation ACM is present in a building, the local education agency shall:

(1) At least repair the damaged area.

(2) Remove the damaged material if it is not feasible, due to technological factors, to repair the damage.

(3) Maintain all thermal system insulation ACM and its covering in an intact state and undamaged condition.

(c)(1) If damaged friable surfacing ACM or damaged friable miscellaneous ACM is present in a building, the local education agency shall select from among the following response actions: encapsulation, enclosure, removal, or repair of the damaged material.

(2) In selecting the response action from among those which meet the definitional standards in § 763.83, the local education agency shall determine which of these response actions protects human health and the environment. For purposes of determining which of these response actions are the least burdensome, the local education agency may then consider local circumstances, including occupancy and use patterns within the school building, and its economic concerns, including short- and long-term costs.

(d) If significantly damaged friable surfacing ACM or significantly damaged friable miscellaneous ACM is present in a building the local education agency shall:

(1) Immediately isolate the functional space and restrict access, unless isolation is not necessary to protect human health and the environment.

(2) Remove the material in the functional space or, depending upon whether enclosure or encapsulation would be sufficient to protect human health and the environment, enclose or encapsulate.

(e) If any friable surfacing ACM, thermal system insulation ACM, or friable miscellaneous ACM that has potential for damage is present in a building, the local education agency shall at least implement an operations and maintenance (O&M) program, as described under § 763.91.

(f) If any friable surfacing ACM, thermal system insulation ACM, or friable miscellaneous ACM that has potential for significant damage is present in a building, the local education agency shall:

(1) Implement an O&M program, as described under § 763.91.

(2) Institute preventive measures appropriate to eliminate the reasonable likelihood that the ACM or its covering will become significantly damaged, deteriorated, or delaminated.

(3) Remove the material as soon as possible if appropriate preventive measures cannot be effectively implemented, or unless other response actions are determined to protect human health and the environment. Immediately isolate the area and restrict access if necessary to avoid an imminent and substantial endangerment to human health or the environment.

(g) Response actions including removal, encapsulation, enclosure, or repair, other than small-scale, short-duration repairs, shall be designed and conducted by persons accredited to design and conduct response actions.

(h) The requirements of this Subpart E in no way supersede the worker protection and work practice requirements under 29 CFR 1926.58 (Occupational Safety and Health Administration (OSHA) asbestos worker protection standards for construction), 40 CFR Part 763, Subpart G (EPA asbestos worker protection standards for public employees), and 40 CFR Part 61, Subpart M (National Emission Standards for Hazardous Air Pollutants—Asbestos).

(i) Completion of response actions. (1) At the conclusion of any action to remove, encapsulate, or enclose ACBM or material assumed to be ACBM, a person designated by the local education agency shall visually inspect each functional space where such action was conducted to determine whether the action has been properly completed.

(2)(i) A person designated by the local education agency shall collect air samples using aggressive sampling as described in Appendix A to this Subpart E to monitor air for clearance after each removal, encapsulation, and enclosure project involving ACBM, except for projects that are of small-scale, short-duration.

(ii) Local education agencies shall have air samples collected under this section analyzed for asbestos using laboratories accredited by the National Bureau of Standards to conduct such analysis using transmission electron microscopy (TEM) or, under circumstances permitted in this section,

laboratories enrolled in the American Industrial Hygiene Association Proficiency Analytical Testing Program for phase contrast microscopy (PCM).

(iii) Until the National Bureau of Standards TEM laboratory accreditation program is operational, local educational agencies shall use laboratories that use the protocol described in Appendix A to Subpart E of this part.

(3) Except as provided in paragraphs (i) (4), (5), (6), or (7) of this section, an action to remove, encapsulate, or enclose ACBM shall be considered complete when the average concentration of asbestos of five air samples collected within the affected functional space and analyzed by the TEM method in Appendix A of this Subpart E, is not statistically significantly different, as determined by the Z-test calculation found in Appendix A of this Subpart E, from the average asbestos concentration of five air samples collected at the same time outside the affected functional space and analyzed in the same manner, and the average asbestos concentration of the three field blanks described in Appendix A of this Subpart E is below the filter background level, as defined in Appendix A of this Subpart E, of 70 structures per square millimeter (70 s/mm ^{2}).

(4) An action may also be considered complete if the volume of air drawn for each of the five samples collected within the affected functional space is equal to or greater than 1,199 L of air for a 25 mm filter or equal to or greater than 2,799 L of air for a 37 mm filter, and the average concentration of asbestos as analyzed by the TEM method in Appendix A of this Subpart E, for the five air samples does not exceed the filter background level, as defined in Appendix A, of 70 structures per square millimeter (70 s/mm ^{2}). If the average concentration of asbestos of the five air samples within the affected functional space exceeds 70 s/mm ^{2}, or if the volume of air in each of the samples is less than 1,199 L of air for a 25 mm filter or less than 2,799 L of air for a 37 mm filter, the action shall be considered complete only when the requirements of paragraph (i) (3), (5), (6), or (7) of this section are met.

(5) At any time, a local education agency may analyze air monitoring samples collected for clearance purposes by phase contrast microscopy (PCM) to confirm completion of removal, encapsulation, or enclosure of ACBM that is greater than small-scale, short-duration and less than or equal to 160 square feet or 260 linear feet. The action shall be considered complete when the results of samples collected in the affected functional space and analyzed by phase contrast microscopy using the National Institute for Occupational Safety and Health (NIOSH) Method 7400 entitled "Fibers" published in the NIOSH Manual of Analytical Methods, 3rd Edition, Second Supplement, August 1987, show that the concentration of fibers for each of the five samples is less than or equal to a limit of quantitation for PCM (0.01 fibers per cubic centimeter (0.01 f/cm ^{3}) of air). The method is available at the Office of the Federal Register Information Center, 11th and L St., NW., Room 8401, Washington, DC 20408, and the EPA OPTS Reading Room, Rm. G004 Northeast Mall, 401 M St., SW., Washington, DC 20460. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. The method is incorporated as it exists on the effective date of this rule, and a notice of any change to the method will be published in the **Federal Register.**

(6) Until October 7, 1989, a local education agency may analyze air monitoring samples collected for clearance purposes by PCM to confirm completion of removal, encapsulation, or enclosure of ACBM that is less than or equal to 3,000 square feet or 1,000 linear feet. The action shall be considered complete when the results of samples collected in the affected functional space and analyzed by PCM using the NIOSH Method 7400 entitled "Fibers" published in the NIOSH Manual of Analytical Methods, 3rd Edition, Second Supplement, August 1987, show that the concentration of fibers for each of the five samples is less than or equal to a limit quantitation for PCM (0.01 fibers per cubic centimeter, 0.01 f/cm ^{3}). The method is available at the Office of the Federal Register, 11th and L St., NW., Room 8301, Washington, DC, 20408, and in the EPA OPTS Reading Room, Rm. G004 Northeast Mall, 401 M St., SW., Washington, DC 20460. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. The method is incorporated as it exists on the effective date of this rule and a notice of any change to the method will be published in the **Federal Register.**

(7) From October 8, 1989, to October 7, 1990, a local education agency may analyze air monitoring samples collected for clearance purposes by PCM to confirm completion of removal, encapsulation, or enclosure of ACBM that is less than or equal to 1,500 square feet or 500 linear feet. The action shall be considered complete when the results of samples collected in the affected functional space and analyzed by PCM using the NIOSH Method 7400 entitled "Fibers" published in the NIOSH Manual of Analytical Methods, 3rd Edition, Second Supplement, August 1987, show that the concentration of fibers for each of the five samples is less than or equal to a limit of quantitation for PCM (0.01 fibers per cubic centimeter, 0.01 f/cm ^{3}). The method is available at the Office of the Federal Register, 11th and L St., NW., Room 8301, Washington, DC, 20408, and in the EPA OPTS Reading Room, Rm. G004 Northeast Mall, 401 M St., SW., Washington, DC 20460. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. The method is incorporated as it exists on the effective date of this rule and a notice of any change to the method will be published in the **Federal Register.**

(8) To determine the amount of ACBM affected under paragraphs (i) (5), (6), and (7) of this section, the local education agency shall add the total square or linear footage of ACBM within the containment barriers used to isolate the functional space for the action to remove, encapsulate, or enclose the ACBM. Contiguous portions of material subject to such action conducted concurrently or at approximately the same time within the same school building shall not be separated to qualify under paragraphs (i) (5), (6), or (7) of this section.

§ 763.91 Operations and maintenance.

(a) *Applicability.* The local education agency shall implement an operations, maintenance, and repair (O&M) program under this section whenever any friable ACBM is present or assumed to be present in a building that it leases, owns, or otherwise uses as a school building. Any material identified as nonfriable ACBM or nonfriable assumed ACBM must be treated as friable ACBM for purposes of this section when the material is about to become friable as a result of activities performed in the school building.

(b) *Worker protection.* The protection provided by EPA at 40 CFR 763.121 for worker protection during asbestos abatement projects is extended to employees of local education agencies who perform operations, maintenance, and repair (O&M) activities involving ACM and who are not covered by the OSHA asbestos construction standard at 29 CFR 1926.58 or an asbestos worker approved by OSHA under section 19 of the Occupational Safety and Health Act. Local education agencies may consult

Appendix B of this Subpart if their employees are performing operations, maintenance, and repair activities that are of small-scale, short-duration.

(c) *Cleaning*—(1) *Initial cleaning.* Unless the building has been cleaned using equivalent methods within the previous 6 months, all areas of a school building where friable ACBM, damaged or significantly damaged thermal system insulation ACM, or friable suspected ACBM assumed to be ACM are present shall be cleaned at least once after the completion of the inspection required by § 763.85(a) and before the initiation of any response action, other than O&M activities or repair, according to the following procedures:

(i) HEPA-vacuum or steam-clean all carpets.

(ii) HEPA-vacuum or wet-clean all other floors and all other horizontal surfaces.

(iii) Dispose of all debris, filters, mopheads, and cloths in sealed, leak-tight containers.

(2) *Additional cleaning.* The accredited management planner shall make a written recommendation to the local education agency whether additional cleaning is needed, and if so, the methods and frequency of such cleaning.

(d) *Operations and maintenance activities.* The local education agency shall ensure that the procedures described below to protect building occupants shall be followed for any operations and maintenance activities disturbing friable ACBM:

(1) Restrict entry into the area by persons other than those necessary to perform the maintenance project, either by physically isolating the area or by scheduling.

(2) Post signs to prevent entry by unauthorized persons.

(3) Shut off or temporarily modify the air-handling system and restrict other sources of air movement.

(4) Use work practices or other controls, such as, wet methods, protective clothing, HEPA-vacuums, mini-enclosures, glove bags, as necessary to inhibit the spread of any released fibers.

(5) Clean all fixtures or other components in the immediate work area.

(6) Place the asbestos debris and other cleaning materials in a sealed, leak-tight container.

(e) *Maintenance activities other than small-scale, short-duration.* The response action for any maintenance activities disturbing friable ACBM, other than small-scale, short-duration maintenance activities, shall be designed by persons accredited to design response actions and conducted by persons accredited to conduct response actions.

(f) *Fiber release episodes*—(1) *Minor fiber release episode.* The local education agency shall ensure that the procedures described below are followed in the event of a minor fiber release episode (i.e., the falling or dislodging of 3 square or linear feet or less of friable ACBM):

(i) Thoroughly saturate the debris using wet methods.

(ii) Clean the area, as described in paragraph (e) of this section.

(iii) Place the asbestos debris in a sealed, leak-tight container.

(iv) Repair the area of damaged ACM with materials such as asbestos-free spackling, plaster, cement, or insulation, or seal with latex paint or an encapsulant, or immediately have the appropriate response action implemented as required by § 763.90.

(2) *Major fiber release episode.* The local education agency shall ensure that the procedures described below are followed in the event of a major fiber release episode (i.e., the falling or dislodging of more than 3 square or linear feet of friable ACBM):

(i) Restrict entry into the area and post signs to prevent entry into the area by persons other than those necessary to perform the response action.

(ii) Shut off or temporarily modify the air-handling system to prevent the distribution of fibers to other areas in the building.

(iii) The response action for any major fiber release episode must be designed by persons accredited to design response actions and conducted by persons accredited to conduct response actions.

§ 763.92 Training and periodic surveillance.

(a) *Training.* (1) The local education agency shall ensure, prior to the implementation of the O&M provisions of the management plan, that all members of its maintenance and custodial staff (custodians, electricians, heating/air conditioning engineers, plumbers, etc.) who may work in a building that contains ACBM receive awareness training of at least 2 hours, whether or not they are required to work with ACBM. New custodial and maintenance employees shall be trained within 60 days after commencement of employment. Training shall include, but not be limited to:

(i) Information regarding asbestos and its various uses and forms.

(ii) Information on the health effects associated with asbestos exposure.

(iii) Locations of ACBM identified throughout each school building in which they work.

(iv) Recognition of damage, deterioration, and delamination of ACBM.

(v) Name and telephone number of the person designated to carry out general local education agency responsibilities under § 763.84 and the availability and location of the management plan.

(2) The local education agency shall ensure that all members of its maintenance and custodial staff who conduct any activities that will result in the disturbance of ACBM shall receive training described in paragraph (a)(1) of this section and 14 hours of additional training. Additional training shall include, but not be limited to:

(i) Descriptions of the proper methods of handling ACBM.

(ii) Information on the use of respiratory protection as contained in the EPA/NIOSH *Guide to Respiratory Protection for the Asbestos Abatement Industry*, September 1986 (EPA 560/OPTS-86-001), available from TSCA Assistance Office (TS-799), Office of Toxic Substances, Environmental Protection Agency, Rm. E-543, 401 M St. SW., Washington, DC 20460, and other personal protection measures.

(iii) The provisions of this section and § 763.91, Appendices A, B, C, D of this Subpart E of this part, EPA regulations contained in 40 CFR Part 763, Subpart G, and in 40 CFR Part 61, Subpart M, and OSHA regulations contained in 29 CFR 1926.58.

(iv) Hands-on training in the use of respiratory protection, other personal protection measures, and good work practices.

(3) Local education agency maintenance and custodial staff who have attended EPA-approved asbestos training or received equivalent training for O&M and periodic surveillance activities involving asbestos shall be considered trained for the purposes of this section.

(b) *Periodic surveillance.* (1) At least once every 6 months after a management plan is in effect, each local education agency shall conduct periodic surveillance in each building that it leases, owns, or otherwise uses as a school building that contains ACBM or is assumed to contain ACBM.

(2) Each person performing periodic surveillance shall:

(i) Visually inspect all areas that are identified in the management plan as ACBM or assumed ACBM.

(ii) Record the date of the surveillance, his or her name, and any

changes in the condition of the materials.

(iii) Submit to the person designated to carry out general local education agency responsibilities under § 763.84 a copy of such record for inclusion in the management plan.

§ 763.93 Management plans.

(a)(1) On or before October 12, 1988, each local education agency shall develop an asbestos management plan for each school, including all buildings that they lease, own, or otherwise use as school buildings, and submit the plan to an Agency designated by the Governor of the State in which the local education agency is located. The plan may be submitted in stages that cover a portion of the school buildings under the authority of the local education agency.

(2) If a building to be used as part of a school is leased or otherwise acquired after October 12, 1988, the local education agency shall include the new building in the management plan for the school prior to its use as a school building. The revised portions of the management plan shall be submitted to the Agency designated by the Governor.

(3) If a local education agency begins to use a building as a school after October 12, 1988, the local education agency shall submit a management plan for the school to the Agency designated by the Governor prior to its use as a school.

(b) On or before October 17, 1987, the Governor of each State shall notify local education agencies in the State regarding where to submit their management plans. States may establish administrative procedures for reviewing management plans. If the Governor does not disapprove a management plan within 90 days after receipt of the plan, the local education agency shall implement the plan.

(c) Each local education agency must begin implementation of its management plan on or before July 9, 1989, and complete implementation in a timely fashion.

(d) Each local education agency shall maintain and update its management plan to keep it current with ongoing operations and maintenance, periodic surveillance, inspection, reinspection, and response action activities. All provisions required to be included in the management plan under this section shall be retained as part of the management plan, as well as any information that has been revised to bring the plan up-to-date.

(e) The management plan shall be developed by an accredited management planner and shall include:

(1) A list of the name and address of each school building and whether the school building contains friable ACBM, nonfriable ACBM, and friable and nonfriable suspected ACBM assumed to be ACM.

(2) For each inspection conducted before the December 14, 1987:

(i) The date of the inspection.

(ii) A blueprint, diagram, or written description of each school building that identifies clearly each location and approximate square or linear footage of any homogeneous or sampling area where material was sampled for ACM, and, if possible, the exact locations where bulk samples were collected, and the dates of collection.

(iii) A copy of the analyses of any bulk samples, dates of analyses, and a copy of any other laboratory reports pertaining to the analyses.

(iv) A description of any response actions or preventive measures taken to reduce asbestos exposure, including if possible, the names and addresses of all contractors involved, start and completion dates of the work, and results of any air samples analyzed during and upon completion of the work.

(v) A description of assessments, required to be made under § 763.88, of material that was identified before December 14, 1987, as friable ACBM or friable suspected ACBM assumed to be ACM, and the name and signature, State of accreditation, and if applicable, accreditation number of each accredited person making the assessments.

(3) For each inspection and reinspection conducted under § 763.85:

(i) The date of the inspection or reinspection and the name and signature, State of accreditation and, if applicable, the accreditation number of each accredited inspector performing the inspection or reinspection.

(ii) A blueprint, diagram, or written description of each school building that identifies clearly each location and approximate square or linear footage of homogeneous areas where material was sampled for ACM, the exact location where each bulk sample was collected, date of collection, homogeneous areas where friable suspected ACBM is assumed to be ACM, and where nonfriable suspected ACBM is assumed to be ACM.

(iii) A description of the manner used to determine sampling locations, and the name and signature of each accredited inspector collecting samples, the State of accreditation, and if applicable, his or her accreditation number.

(iv) A copy of the analyses of any bulk samples collected and analyzed, the name and address of any laboratory that analyzed bulk samples, a statement that the laboratory meets the applicable requirements of § 763.87(a) the date of analysis, and the name and signature of the person performing the analysis.

(v) A description of assessments, required to be made under § 763.88, of all ACBM and suspected ACBM assumed to be ACM, and the name, signature, State of accreditation, and if applicable, accreditation number of each accredited person making the assessments.

(4) The name, address, and telephone number of the person designated under § 763.84 to ensure that the duties of the local education agency are carried out, and the course name, and dates and hours of training taken by that person to carry out the duties.

(5) The recommendations made to the local education agency regarding response actions, under § 763.88(d), the name, signature, State of accreditation of each person making the recommendations, and if applicable, his or her accreditation number.

(6) A detailed description of preventive measures and response actions to be taken, including methods to be used, for any friable ACBM, the locations where such measures and action will be taken, reasons for selecting the response action or preventive measure, and a schedule for beginning and completing each preventive measure and response action.

(7) With respect to the person or persons who inspected for ACBM and who will design or carry out response actions, except for operations and maintenance, with respect to the ACBM, one of the following statements:

(i) If the State has adopted a contractor accreditation program under section 206(b) of Title II of the Act, a statement that the person(s) is accredited under such plan.

(ii) A statement that the local education agency used (or will use) persons who have been accredited by another State which has adopted a contractor accreditation plan under section 206(b) of Title II of the Act or is accredited by an EPA-approved course under section 206(c) of Title II of the Act.

(8) A detailed description in the form of a blueprint, diagram, or in writing of any ACBM or suspected ACBM assumed to be ACM which remains in the school once response actions are undertaken pursuant to § 763.90. This description shall be updated as response actions are completed.

(9) A plan for reinspection under § 763.85, a plan for operations and maintenance activities under § 763.91,

and a plan for periodic surveillance under § 763.92, a description of the recommendation made by the management planner regarding additional cleaning under § 763.91(c)(2) as part of an operations and maintenance program, and the response of the local education agency to that recommendation.

(10) A description of steps taken to inform workers and building occupants, or their legal guardians, about inspections, reinspections, response actions, and post-response action activities, including periodic reinspection and surveillance activities that are planned or in progress.

(11) An evaluation of the resources needed to complete response actions successfully and carry out reinspection, operations and maintenance activities, periodic surveillance and training.

(12) With respect to each consultant who contributed to the management plan, the name of the consultant and one of the following statements:

(i) If the State has adopted a contractor accreditation plan under section 206(b) of Title II of the Act, a statement that the consultant is accredited under such plan.

(ii) A statement that the contractor is accredited by another State which has adopted a contractor accreditation plan under section 206(b) of Title II of the Act, or is accredited by an EPA-approved course developed under section 206(c) of Title II of the Act.

(f) A local education agency may require each management plan to contain a statement signed by an accredited management plan developer that such person has prepared or assisted in the preparation of such plan or has reviewed such plan, and that such plan is in compliance with this Subpart E. Such statement may not be signed by a person who, in addition to preparing or assisting in preparing the management plan, also implements (or will implement) the management plan.

(g)(1) Upon submission of a management plan to the Governor for review, a local education agency shall keep a copy of the plan in its administrative office. The management plans shall be available, without cost or restriction, for inspection by representatives of EPA and the State, the public, including teachers, other school personnel and their representatives, and parents. The local education agency may charge a reasonable cost to make copies of management plans.

(2) Each local education agency shall maintain in its administrative office a complete, updated copy of a management plan for each school under its administrative control or direction. The management plans shall be available, during normal business hours, without cost or restriction, for inspection by representatives of EPA and the State, the public, including teachers, other school personnel and their representatives, and parents. The local education agency may charge a reasonable cost to make copies of management plans.

(3) Each school shall maintain in its administrative office a complete, updated copy of the management plan for that school. Management plans shall be available for inspection, without cost or restriction, to workers before work begins in any area of a school building. The school shall make management plans available for inspection to representatives of EPA and the State, the public, including parents, teachers, and other school personnel and their representatives within 5 working days after receiving a request for inspection. The school may charge a reasonable cost to make copies of the management plan.

(4) Upon submission of its management plan to the Governor and at least once each school year, the local education agency shall notify in writing parent, teacher, and employee organizations of the availability of management plans and shall include in the management plan a description of the steps taken to notify such organizations, and a dated copy of the notification. In the absence of any such organizations for parents, teachers, or employees, the local education agency shall provide written notice to that relevant group of the availability of management plans and shall include in the management plan a description of the steps taken to notify such groups, and a dated copy of the notification.

(h) Records required under § 763.94 shall be made by local education agencies and maintained as part of the management plan.

(i) Each management plan must contain a true and correct statement, signed by the individual designated by the local education agency under § 763.84, which certifies that the general, local education agency responsibilities, as stipulated by § 763.84, have been met or will be met.

§ 763.94 Recordkeeping.

(a) Records required under this section shall be maintained in a centralized location in the administrative office of both the school and the local education agency as part of the management plan. For each homogeneous area where all ACBM has been removed, the local education agency shall ensure that such records are retained for 3 years after the next reinspection required under § 763.85(b)(1), or for an equivalent period.

(b) For each preventive measure and response action taken for friable and nonfriable ACBM and friable and nonfriable suspected ACBM assumed to be ACM, the local education agency shall provide:

(1) A detailed written description of the measure or action, including methods used, the location where the measure or action was taken, reasons for selecting the measure or action, start and completion dates of the work, names and addresses of all contractors involved, and if applicable, their State of accreditation, and accreditation numbers, and if ACBM is removed, the name and location of storage or disposal site of the ACM.

(2) The name and signature of any person collecting any air sample required to be collected at the completion of certain response actions specified by § 763.90(i), the locations where samples were collected, date of collection, the name and address of the laboratory analyzing the samples, the date of analysis, the results of the analysis, the method of analysis, the name and signature of the person performing the analysis, and a statement that the laboratory meets the applicable requirements of § 763.90(i)(2)(ii).

(c) For each person required to be trained under § 763.92(a) (1) and (2), the local education agency shall provide the person's name and job title, the date that training was completed by that person, the location of the training, and the number of hours completed in such training.

(d) For each time that periodic surveillance under § 763.92(b) is performed, the local education agency shall record the name of each person performing the surveillance, the date of the surveillance, and any changes in the conditions of the materials.

(e) For each time that cleaning under § 763.91(c) is performed, the local education agency shall record the name of each person performing the cleaning, the date of such cleaning, the locations cleaned, and the methods used to perform such cleaning.

(f) For each time that operations and maintenance activities under § 763.91(d) are performed, the local education agency shall record the name of each person performing the activity, the start and completion dates of the activity, the locations where such activity occurred, a description of the activity including preventive measures used, and if ACBM

is removed, the name and location of storage or disposal site of the ACM.

(g) For each time that major asbestos activity under § 763.91(e) is performed, the local education agency shall provide the name and signature, State of accreditation, and if applicable, the accreditation number of each person performing the activity, the start and completion dates of the activity, the locations where such activity occurred, a description of the activity including preventive measures used, and if ACBM is removed, the name and location of storage or disposal site of the ACM.

(h) For each fiber release episode under § 763.91(f), the local education agency shall provide the date and location of the episode, the method of repair, preventive measures or response action taken, the name of each person performing the work, and if ACBM is removed, the name and location of storage or disposal site of the ACM.

(Approved by the Office of Management and Budget under control number 2070-0091)

§ 763.95 Warning labels.

(a) The local education agency shall attach a warning label immediately adjacent to any friable and nonfriable ACBM and suspected ACBM assumed to be ACM located in routine maintenance areas (such as boiler rooms) at each school building. This shall include:

(1) Friable ACBM that was responded to by a means other than removal.

(2) ACBM for which no response action was carried out.

(b) All labels shall be prominently displayed in readily visible locations and shall remain posted until the ACBM that is labeled is removed.

(c) The warning label shall read, in print which is readily visible because of large size or bright color, as follows: CAUTION: ASBESTOS. HAZARDOUS. DO NOT DISTURB WITHOUT PROPER TRAINING AND EQUIPMENT.

§ 763.97 Compliance and enforcement.

(a) *Compliance with Title II of the Act.* (1) Section 207(a) of Title II of the Act (15 U.S.C. 2647) makes it unlawful for any local education agency to:

(i) Fail to conduct inspections pursuant to section 203(b) of Title II of the Act, including failure to follow procedures and failure to use accredited personnel and laboratories.

(ii) Knowingly submit false information to the Governor regarding any inspection pursuant to regulations under section 203(i) of Title II of the Act.

(iii) Fail to develop a management plan pursuant to regulations under section 203(i) of Title II of the Act.

(2) Section 207(a) of Title II of the Act (15 U.S.C. 2647) also provides that any local education agency which violates any provision of section 207 shall be liable for a civil penalty of not more than $5,000 for each day during which the violation continues. For the purposes of this subpart, a "violation" means a failure to comply with respect to a single school building.

(b) *Compliance with Title I of the Act.* (1) Section 15(1)(D) of Title I of the Act (15 U.S.C. 2614) makes it unlawful for any person to fail or refuse to comply with any requirement of Title II or any rule promulgated or order issued under Title II. Therefore, any person who violates any requirement of this Subpart is in violation of section 15 of Title I of the Act.

(2) Section 15(3) of Title I of the Act (15 U.S.C. 2614) makes it unlawful for any person to fail or refuse to establish or maintain records, submit reports, notices or other information, or permit access to or copying of records, as required by this Act or a rule thereunder.

(3) Section 15(4) (15 U.S.C. 2614) of Title I of the Act makes it unlawful for any person to fail or refuse to permit entry or inspection as required by section 11 of Title I of the Act.

(4) Section 16(a) of Title I of the Act (15 U.S.C. 2615) provides that any person who violates any provision of section 15 of Title I of the Act shall be liable to the United States for a civil penalty in an amount not to exceed $25,000 for each such violation. Each day such a violation continues shall, for purposes of this paragraph, constitute a separate violation of section 15. A local education agency is not liable for any civil penalty under Title I of the Act for failing or refusing to comply with any rule promulgated or order issued under Title II of the Act.

(c) *Criminal penalties.* If any violation committed by any person (including a local education agency) is knowing or willful, criminal penalties may be assessed under section 16(b) of Title I of the Act.

(d) *Injunctive relief.* The Agency may obtain injunctive relief under section 208(b) of Title II of the Act to respond to a hazard which poses an imminent and substantial endangerment to human health or the environment or section 17 (15 U.S.C. 2616) of Title I of the Act to restrain any violation of section 15 of Title I of the Act or to compel the taking of any action required by or under Title I of the Act.

(e) *Citizen complaints.* Any citizen who wishes to file a complaint pursuant to section 207(d) of Title II of the Act should direct the complaint to the Governor of the State or the EPA Asbestos Ombudsman, 401 M Street, SW., Washington, DC 20460. The citizen complaint should be in writing and identified as a citizen complaint pursuant to section 207(d) of Title II of TSCA. The EPA Asbestos Ombudsman or the Governor shall investigate and respond to the complaint within a reasonable period of time if the allegations provide a reasonable basis to believe that a violation of the Act has occurred.

(f) *Inspections.* EPA may conduct inspections and review management plans under section 11 of Title I of the Act (15 U.S.C. 2610) to ensure compliance.

§ 763.98 Waiver; delegation to State.

(a) *General.* (1) Upon request from a State Governor and after notice and comment and an opportunity for a public hearing in accordance with paragraphs (b) and (c) of this section, EPA may waive some or all of the requirements of this Subpart E if the State has established and is implementing or intends to implement a program of asbestos inspection and management that contains requirements that are at least as stringent as the requirements of this Subpart E.

(2) A waiver from any requirement of this Subpart E shall apply only to the specific provision for which a waiver has been granted under this section. All requirements of this Subpart E shall apply until a waiver is granted under this section.

(b) *Request.* Each request by a Governor to waive any requirement of this Subpart E shall be sent with three complete copies of the request to the Regional Administrator for the EPA Region in which the State is located and shall include:

(1) A copy of the State provisions or proposed provisions relating to its program of asbestos inspection and management in schools for which the request is made.

(2)(i) The name of the State agency that is or will be responsible for administering and enforcing the requirements for which a waiver is requested, the names and job titles of responsible officials in that agency, and phone numbers where the officials can be contacted.

(ii) In the event that more than one agency is or will be responsible for administering and enforcing the requirements for which a waiver is requested, a description of the functions to be performed by each agency, how the program will be coordinated by the lead agency to ensure consistency and

effective administration in the asbestos inspection and management program within the State, the names and job titles of responsible officials in the agencies, and phone numbers where the officials can be contacted. The lead agency will serve as the central contact point for the EPA.

(3) Detailed reasons, supporting papers, and the rationale for concluding that the State's asbestos inspection and management program provisions for which the request is made are at least as stringent as the requirements of this Subpart E.

(4) A discussion of any special situations, problems, and needs pertaining to the waiver request accompanied by an explanation of how the State intends to handle them.

(5) A statement of the resources that the State intends to devote to the administration and enforcement of the provisions relating to the waiver request.

(6) Copies of any specific or enabling State laws (enacted and pending enactment) and regulations (promulgated and pending promulgation) relating to the request, including provisions for assessing criminal and/or civil penalties.

(7) Assurance from the Governor, the Attorney General, or the legal counsel of the lead agency that the lead agency or other cooperating agencies have the legal authority necessary to carry out the requirements relating to the request.

(c) *General notice—hearing.* (1) Within 30 days after receipt of a request for a waiver, EPA will determine the completeness of the request. If EPA does not request further information within the 30-day period, the request will be deemed complete.

(2) Within 30 days after EPA determines that a request is complete, EPA will issue for publication in the Federal Register a notice that announces receipt of the request, describes the information submitted under paragraph (b) of this section, and solicits written comment from interested members of the public. Comments must be submitted within 60 days.

(3) If, during the comment period, EPA receives a written objection to a Governor's request and a request for a public hearing detailing specific objections to the granting of a waiver, EPA will schedule a public hearing to be held in the affected State after the close of the comment period and will announce the public hearing date in the Federal Register before the date of the hearing. Each comment shall include the name and address of the person submitting the comment.

(d) *Criteria.* EPA may waive some or all of the requirements of Subpart E of this part if:

(1) The State's lead agency and other cooperating agencies have the legal authority necessary to carry out the provisions of asbestos inspection and management in schools relating to the waiver request.

(2) The State's program of asbestos inspection and management in schools relating to the waiver request and implementation of the program are or will be at least as stringent as the requirements of this Subpart E.

(3) The State has an enforcement mechanism to allow it to implement the program described in the waiver request.

(4) The lead agency and any cooperating agencies have or will have qualified personnel to carry out the provisions relating to the waiver request.

(5) The State will devote adequate resources to the administration and enforcement of the asbestos inspection and management provisions relating to the waiver request.

(6) When specified by EPA, the State gives satisfactory assurances that necessary steps, including specific actions it proposes to take and a time schedule for their accomplishment, will be taken within a reasonable time to conform with applicable criteria under paragraph (d) (2) through (4) of this section.

(e) *Decision.* EPA will issue for publication in the Federal Register a notice announcing its decision to grant or deny, in whole or in part, a Governor's request for a waiver from some or all of the requirements of this Subpart E within 30 days after the close of the comment period or within 30 days following a public hearing, whichever is applicable. The notice will include the Agency's reasons and rationale for granting or denying the Governor's request. The 30-day period may be extended if mutually agreed upon by EPA and the State.

(f) *Modifications.* When any substantial change is made in the administration or enforcement of a State program for which a waiver was granted under this section, a responsible official in the lead agency shall submit such changes to EPA.

(g) *Reports.* The lead agency in each State that has been granted a waiver by EPA from any requirement of Subpart E of this part shall submit a report to the Regional Administrator for the Region in which the State is located at least once every 12 months to include the following information:

(1) A summary of the State's implementation and enforcement activities during the last reporting period relating to provisions waived under this section, including enforcement actions taken.

(2) Any changes in the administration or enforcement of the State program implemented during the last reporting period.

(3) Other reports as may be required by EPA to carry out effective oversight of any requirement of this Subpart E that was waived under this section.

(h) *Oversight.* EPA may periodically evaluate the adequacy of a State's implementation and enforcement of and resources devoted to carrying out requirements relating to the waiver. This evaluation may include, but is not limited to, site visits to local education agencies without prior notice to the State.

(i) *Informal conference.* (1) EPA may request that an informal conference be held between appropriate State and EPA officials when EPA has reason to believe that a State has failed to:

(i) Substantially comply with the terms of any provision that was waived under this section.

(ii) Meet the criteria under paragraph (d) of this section, including the failure to carry out enforcement activities or act on violations of the State program.

(2) EPA will:

(i) Specify to the State those aspects of the State's program believed to be inadequate.

(ii) Specify to the State the facts that underlie the belief of inadequacy.

(3) If EPA finds, on the basis of information submitted by the State at the conference, that deficiencies did not exist or were corrected by the State, no further action is required.

(4) Where EPA finds that deficiencies in the State program exist, a plan to correct the deficiencies shall be negotiated between the State and EPA. The plan shall detail the deficiencies found in the State program, specify the steps the State has taken or will take to remedy the deficiencies, and establish a schedule for each remedial action to be initiated.

(j) *Rescission.* (1) If the State fails to meet with EPA or fails to correct deficiencies raised at the informal conference, EPA will deliver to the Governor of the State and a responsible official in the lead agency a written notice of its intent to rescind, in whole or part, the waiver.

(2) EPA will issue for publication in the Federal Register a notice that announces the rescission of the waiver, describes those aspects of the State's

program determined to be inadequate, and specifies the facts that underlie the findings of inadequacy.

§ 763.99 Exclusions.

(a) A local education agency shall not be required to perform an inspection under § 763.85(a) in any sampling area as defined in 40 CFR 763.103 or homogeneous area of a school building where:

(1) An accredited inspector has determined that, based on sampling records, friable ACBM was identified in that homogeneous or sampling area during an inspection conducted before December 14, 1987. The inspector shall sign and date a statement to that effect with his or her State of accreditation and if applicable, accreditation number and, within 30 days after such determination, submit a copy of the statement to the person designated under § 763.84 for inclusion in the management plan. However, an accredited inspector shall assess the friable ACBM under § 763.88.

(2) An accredited inspector has determined that, based on sampling records, nonfriable ACBM was identified in that homogeneous or sampling area during an inspection conducted before December 14, 1987. The inspector shall sign and date a statement to that effect with his or her State of accreditation and if applicable, accreditation number and, within 30 days after such determination, submit a copy of the statement to the person designated under § 763.84 for inclusion in the management plan. However, an accredited inspector shall identify whether material that was nonfriable has become friable since that previous inspection and shall assess the newly-friable ACBM under § 763.88.

(3) Based on sampling records and inspection records, an accredited inspector has determined that no ACBM is present in the homogeneous or sampling area and the records show that the area was sampled, before December 14, 1987 in substantial compliance with § 763.85(a), which for purposes of this section means in a random manner and with a sufficient number of samples to reasonably ensure that the area is not ACBM.

(i) The accredited inspector shall sign and date a statement, with his or her State of accreditation and if applicable, accreditation number that the homogeneous or sampling area determined not to be ACBM was sampled in substantial compliance with § 763.85(a).

(ii) Within 30 days after the inspector's determination, the local education agency shall submit a copy of the inspector's statement to the EPA Regional Office and shall include the statement in the management plan for that school.

(4) The lead agency responsible for asbestos inspection in a State that has been granted a waiver from § 763.85(a) has determined that, based on sampling records and inspection records, no ACBM is present in the homogeneous or sampling area and the records show that the area was sampled before December 14, 1987, in substantial compliance with § 763.85(a). Such determination shall be included in the management plan for that school.

(5) An accredited inspector has determined that, based on records of an inspection conducted before December 14, 1987, suspected ACBM identified in that homogeneous or sampling area is assumed to be ACM. The inspector shall sign and date a statement to that effect, with his or her State of accreditation and if applicable, accreditation number and, within 30 days of such determination, submit a copy of the statement to the person designated under § 763.84 for inclusion in the management plan. However, an accredited inspector shall identify whether material that was nonfriable suspected ACBM assumed to be ACM has become friable since the previous inspection and shall assess the newly friable material and previously identified friable suspected ACBM assumed to be ACM under § 763.88.

(6) Based on inspection records and contractor and clearance records, an accredited inspector has determined that no ACBM is present in the homogeneous or sampling area where asbestos removal operations have been conducted before December 14, 1987, and shall sign and date a statement to that effect and include his or her State of accreditation and, if applicable, accreditation number. The local education agency shall submit a copy of the statement to the EPA Regional Office and shall include the statement in the management plan for that school.

(7) An architect or project engineer responsible for the construction of a new school building built after October 12, 1988, or an accredited inspector signs a statement that no ACBM was specified as a building material in any construction document for the building, or, to the best of his or her knowledge, no ACBM was used as a building material in the building. The local education agency shall submit a copy of the signed statement of the architect, project engineer, or accredited inspector to the EPA Regional Office and shall include the statement in the management plan for that school.

(b) The exclusion, under paragraph (a) (1) through (4) of this section, from conducting the inspection under § 763.85(a) shall apply only to homogeneous or sampling areas of a school building that were inspected and sampled before October 17, 1987. The local education agency shall conduct an inspection under § 763.85(a) of all areas inspected before October 17, 1987, that were not sampled or were not assumed to be ACM.

(c) If ACBM is subsequently found in a homogeneous or sampling area of a local education agency that had been identified as receiving an exclusion by an accredited inspector under paragraphs (a) (3), (4), (5) of this section, or an architect, project engineer or accredited inspector under paragraph (a)(7) of this section, the local education agency shall have 180 days following the date of identification of ACBM to comply with this Subpart E.

Appendix A to Subpart E—Interim Transmission Electron Microscopy Analytical Methods—Mandatory and Nonmandatory—and Mandatory Section to Determine Completion of Response Actions

I. Introduction

The following appendix contains three units. The first unit is the mandatory transmission electron microscopy (TEM) method which all laboratories must follow; it is the minimum requirement for analysis of air samples for asbestos by TEM. The mandatory method contains the essential elements of the TEM method. The second unit contains the complete non-mandatory method. The non-mandatory method supplements the mandatory method by including additional steps to improve the analysis. EPA recommends that the non-mandatory method be employed for analyzing air filters; however, the laboratory may choose to employ the mandatory method. The non-mandatory method contains the same minimum requirements as are outlined in the mandatory method. Hence, laboratories may choose either of the two methods for analyzing air samples by TEM.

The final unit of this Appendix A to Subpart E defines the steps which must be taken to determine completion of response actions. This unit is mandatory.

II. Mandatory Transmission Electron Microscopy Method

A. Definitions of Terms

1. "Analytical sensitivity"—Airborne asbestos concentration represented by each fiber counted under the electron

AMENDMENT NO. 2

DATED SEPTEMBER 19, 1990

TO

ASBESTOS-CONTAINING
MATERIALS MANAGEMENT
PLAN

DATED MAY 9, 1989

FOR

MT. WASHINGTON ELEMENTARY SCHOOL

PS #221

ISSUED BY THE

BALTIMORE CITY PUBLIC SCHOOLS

ASBESTOS COORDINATOR AND

DESIGNATED LOCAL EDUCATION

AGENCY REPRESENTATIVE

APPENDIX C

REMAINING ACM AFTER COMPLETION OF RESPONSE ACTIONS CONTAINED IN THIS APPENDIX

TABLE 1-A
ACM QUANTITIES BY APPLICATION

FOR PS 221

ACM APPLICATION	QUANTITY SQUARE FEET	QUANTITY LINEAR FEET
CEILINGS & WALLS		
SPRAYED-ON		
TILE		
ACOUSTIC PLASTER		
OTHER PLASTER		
WALLBOARD		
FLOOR COVERINGS	3000	
MECHANICAL		
PIPE		2530
ELBOWS & FITTINGS	1410	
BOILERS & BREECHING	400	
TANKS	106	
DUCTWORK		
OTHER (GASKETS, FLEXIBLE CONNECTORS, ETC)		
OTHER		
CURTAINS		
FIREDOORS	126	
CEMENT BOARD		

NOTE: FOR LOCATIONS OF ACBM APPLICATIONS, SEE THE PRECEDING TEXT IN THIS SECTION (1.2) AND APPENDIX H.

Marcor of Maryland, Inc.
AHERA Trained Personnel

January, 1989

Name	Date	Cert. #	Hours	Exp. Date
Ronald R. Gaynor	1/30/89	89-0270	08	1/90

February, 1989

Name	Date	Cert. #	Hours	Exp. Date
Mark Jones	2/07/89	89-0304	24	2/90
Robert Quinlan	2/07/89	89-0299	32	2/90
Robert Sparks	2/07/89	89-0305	24	2/90
Shawn Washington	2/15/89	WLA302158808		2/90
Zachary Washington	2/15/89	WLA302158806		2/90

March, 1989

Name	Date	Cert. #	Hours	Exp. Date
O.B. Bounsynhanong	3/23/89	89-0624	24	3/90
Billy Dickerson	3/16/89	89-0552	24	3/90
N. Haneluxay	3/06/89	89-0496	24	3/90
Scott Hartman	3/29/89	89-0665	08	3/90
Yomi Humphrey	3/06/89	89-0503	08	3/90
Jim Kelbaugh	3/29/89	89-0669	08	3/90
Khai Keohanam	3/16/89	89-0571	24	3/90
Phath Keohanam	3/16/89	89-0572	24	3/90
Richard G. Kirvosh	3/06/89	89-0498	08	3/90
Greg Lusk	3/06/89	89-0507	08	3/90
Pairuch Singparu	3/23/89	89-0622	24	3/90
S. Soorinhong	3/06/89	89-0495	08	3/90
Mark Stein	3/16/89	89 0555	24	3/90
Dennis Street	3/06/89	89-0504	08	3/90
Amos Tomlin	3/06/89	89-0499	08	3/90
Vankham Vongsaly	3/23/89	89-0623	24	3/90
Larry Williams	3/06/89	89-0494	08	3/90
F. Zambelli	3/06/89	89-0497	08	3/90
Dolly Wood	3/02/89	89-0446	24	3/90

May, 1989

Name	Date	Cert. #	Hour	Exp. Date
Richard Bennett	5/26/89	89-2275	08	5/90
Brian W. Brown	5/25/89	89-2237	24	5/90
Richard Eikenberg	5/26/89	89-2276	08	5/90

May, 1989

Name	Date	Cert. #	Hours	Exp. Date
L.W. Lucas	5/05/89	89-1885	08	5/90
Reginald Owens	5/01/89	89-1846	24	5/90
Charles O. Pamplin	5/01/89	89-1845	24	5/90
Alan Willis	5/18/89	89-1940	24	5/90

June, 1989

Name	Date	Cert. #	Hours	Exp. Date
Rufus E. Carwell	6/05/89	89-2334	24	6/90
Frederick D. Cobb	6/08/89	89-2337	24	6/90
Harry L. Goode, Sr.	6/06/89	89-2325	24	6/90
Willie C. Guyton	6/15/89	89-2413	24	6/90
Bobby L. Hall	6/22/89	89-2504	24	6/90
Bounthay Homsombath	6/29/89	89-2607	24	6/90
Vilay Homsombath	6/29/89	89-2606	24	6/90
Bobby Jackson	6/01/89	89-2282	24	6/90
Elmer Johnson, Jr.	6/16/89	89-2472	08	6/90
Jack McCargish	6/01/89	89-2285	24	6/90
Gary Nelson	6/05/89	89-2327	24	6/90
Michael Rudensky	6/08/89	89-2338	24	6/90
Lay Sinpraseuth	6/29/89	89-2608	24	6/90
Wendell Smith	6/15/89	89-2398	24	6/90
Roland Summers	6/05/89	89-2332	24	6/90
Clarence Tyson	6/08/89	89-2350	24	6/90
Warren E. Workman	6/05/89	89-2335	24	6/90
Quentin Batts	6/24/89	89-3657	08	6/90
Robert S. Brown	6/29/89	89-3711	08	6/90
Arthur Canada	6/24/89	89-3654	08	6/90
Michael D. Elliott	6/07/89	89-2713	24	6/90
Femi R. Jinadu	6/07/89	89-2706	24	6/90
Paul Jones	6/13/89	89-3582	24	6/90
Terry L. Merchant	6/24/89	89-3642	08	6/90

July, 1990

Name	Date	Cert. #	Hours	Exp. Date
Darryl McCoy	7/29/89	89-3718	08	7/90
Jeffrey McCoy	7/27/89	89-3692	08	7/90
Gardner Parks	7/24/89	89-3653	08	7/90
Willie M. Parson	7/13/89	89-3578	24	7/90
Somphone Pathoumthong	7/29/89	89-3713	08	7/90
Charles Rainey	7/24/89	89-3644	08	7/90
Duane Rainey	7/24/89	89-3645	08	7/90
Frederick J. Scott	7/27/89	89-3689	08	7/90
Yang Song	7/24/89	89-3655	08	7/90

July, 1990

Name	Date	Cert. #	Hours	Exp. Date
Lun Thock	7/29/89	89-3715	08	7/90
William Tyson	7/24/89	89-3647	08	7/90
Sack Vongphakoy	7/27/89	89-3693	08	7/90
Donald T. Wilson	7/19/89	89-3624	08	7/90

August, 1989

Name	Date	Cert. #	Hours	Exp. Date
Joyce Beal	8/17/89	89-4078	24	8/90
Cheri Coffey	8/10/89	89-4002	24	8/90
Thomas Head	8/24/89	89-4119	24	8/90
Donnie Jackson	8/31/89	89-4195	24	8/90
Charles Johnson	8/31/89	89-4191	24	8/90
Keith Jones	8/18/89	89-4097	08	8/90
Gordon Kelly	8/18/89	89-4098	08	8/90
Khamoune Maniphone	8/21/89	89-4108	08	8/90
Deron Maynard	8/21/89	89-4107	08	8/90
Keith Morris	8/17/89	89-4075	24	8/90
Somphone Sirisook	8/21/89	89-4113	08	8/90
Melvin Smith	8/11/89	89-4039	08	8/90
John Stewart	8/17/89	89-4079	24	8/90
George Uzzle, Jr.	8/31/89	89-4194	24	8/90
Keith Williams	8/10/89	89-3993	24	8/90
Edgar Wilson	8/31/89	89-4192	24	8/90
Nathaniel Witherspoon	8/17/89	89-4072	24	8/90
Prince Wobo	8/24/89	89-4115	24	8/90
George Uzzle, Jr.	8/31/89	89-4194	24	8/90

September, 1989

Name	Date	Cert. #	Hours	Exp. Date
Sandford D. Becote	9/14/89	89-4255	24	9/90
Lionel Brown	9/21/89	89-4289	24	9/90
Kevin Davis	9/21/89	89-4288	24	9/90
Edmond Geohagan	9/29/89	89-4359	08	9/90
Kermit Nelson-Bey	9/14/89	89-4266	24	9/90

October, 1989

Name	Date	Cert. #	Hours	Exp. Date
Ocie L. Black, Jr.	10/12/89	89-4404	24	10/90
Allan Daughtry	10/12/89	89-4421	08	10/90
Ronald Harvey	10/20/89	89-4478	08	10/90

October, 1989

Name	Date	Cert. #	Hours	Exp. Date
Joseph H. Jones	10/12/89	89-4407	24	10/90
Obediah U. Nwagbanaoche	10/12/89	89-4409	24	10/90
Sam Boun Phavivong	10/12/89	89-4398	24	10/90
Harry Taylor	10/26/89	89-4484	24	10/90
Eric Tucker	10/26/89	89-4483	24	10/90
Bob Brant				

November, 1989

Name	Date	Cert. #	Hours	Exp. Date
Bounthiem Boutchaleune	11/02/89	89-4580	24	11/90
Bob Brant	11/17/89	89-4716	32	11/90
Bouaphan Inthavong	11/16/89	89-4729	24	11/90
Allen Johnson	11/16/89	89-4732	24	11/90
Jeffrey B. Merson	11/22/89	89-4740	24	11/90
Michael Mote	11/03/89	89-4589	08	11/90
Tim Phavivong	11/02/89	89-4581	24	11/90
Seuy Sayngam	11/16/89	89-4728	24	11/90
Mark C. Smith	11/09/89	89-4891	24	11/90
Bouachan Vilayvong	11/16/89	89-4730	24	11/90
Donald Wilson	11/16/89	89-4731	24	11/90

December, 1989

Name	Date	Cert. #	Hours	Exp. Date
Donald Jackson	12/14/89	89-4879	08	12/90
William G. Jones	12/14/89	89-4818	24	12/90
Thomas A. Kochel	12/14/89	89-4819	24	12/90
B.H. Souvanavong	12/14/89	89-4874	08	12/90
Bill Swaggerty	12/14/89	89-4876	08	12/90

January, 1990

Name	Date	Cert. #	Hours	Exp. Date
Robin Baconis	1/04/90	90-0043	08	1/91
Choi	1/04/90	90-0041	08	1/91
Khamla Khantry	1/04/90	90-0042	08	1/91
Albert Kutz	1/04/90	90-0036	08	1/91
Cha Phimphanh	1/04/90	90-0040	08	1/91
Chanphasouk Thongdygnglat	1/02/90	90-0046	08	1/91

July 1989 TO July 1990

ASBESTOS MANAGEMENT PROGRAM

FIELD INSPECTION LOG OF QUARTERLY SURVEILANCE

FOR SCHOOL P.S. 221

1ST QUARTER INSPECTION

Performed by See Attached Form

Date Performed For October 1989 Inspection

2ND QUARTER INSPECTION

Performed by Roland M. Diggs

Date Performed 2/8/90

3RD QUARTER INSPECTION

Performed by

Date Performed

4TH QUARTER INSPECTION

Performed by Roland M. Diggs

Date Performed 6/29/90

SEE ATTACHED SURVEILANCE REPORT FORMS FOR FINDINGS

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 10/3/89 SURVEYOR: Roland M. Diggs

SCHOOL NO: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
01- Boiler Room	Boiler breeching block and trowelled-on insulation		✓		✓				✓	
	Hot water generator block and trowelled-on insulation		✓		✓				✓	
	Heating system preformed pipe insulation		✓		✓				✓	
	Heating system fitting and valve trowelled-on insulation		✓		✓				✓	
	Domestic water fitting and valve trowelled-on insulation		✓		✓				✓	
	Fire door		✓		✓				✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 10/3/89 SURVEYOR: Roland M. Diggs

SCHOOL NO: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
02- Crawl Space	Heating system preformed pipe insulation		✓		✓				✓	
	Heating system fitting trowelled-on insulation		✓		✓				✓	
	Domestic water fitting trowelled-on insulation		✓		✓				✓	
03- Above Suspended Ceilings and in Pipe Chases	Heating system preformed pipe insulation		✓		✓				✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 10/3/89 SURVEYOR: Roland M. Diggs

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
06- Hallways and Stairwells	Heating system preformed pipe insulation		✓		✓				✓	
	Heating system fitting trowelled-on insulation		✓		✓				✓	
	Vinyl asbestos tile		✓		✓				✓	
07- Storage Areas	Heating system preformed pipe insulation		✓		✓				✓	
	Heating system fitting trowelled-on insulation		✓		✓				✓	
	Domestic water fitting trowelled-on insulation		✓		✓				✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 10/3/89 SURVEYOR: Roland M. Diggs

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Heating system fitting trowelled-on insulation		✓		✓				✓	
	Domestic water fitting trowelled-on insulation		✓		✓				✓	
04- Cafeteria	Vinyl asbestos tile		✓		✓				✓	
	Fire doors (2)		✓		✓				✓	
05- Incinerator Room	Domestic water fitting trowelled-on insulation		✓		✓				✓	
	Fire door		✓		✓				✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 10/3/89 SURVEYOR: Roland M. Diggs

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
08- Classrooms	Heating system preformed pipe insulation		✓		✓				✓	
	Heating system fitting trowelled-on insulation		✓		✓				✓	
	Vinyl asbestos tile		✓		✓				✓	
09- Multi-Purpose Room and Stage	Heating system preformed pipe insulation		✓		✓				✓	
	Heating system fitting trowelled-on insulation		✓		✓				✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 10/9/89

SCHOOL NO.: PS221

SURVEYOR: Roland (M.) Diggs

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation		✓		✓				✓	
	Vinyl asbestos tile		✓		✓				✓	
	Fire doors (2)		✓		✓				✓	
10- Toilets	Heating system preformed pipe insulation		✓		✓				✓	
	Heating system fitting trowelled-on insulation		✓		✓				✓	
	Domestic water fitting trowelled-on insulation		✓		✓				✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 10/3/89 SURVEYOR: Roland M. Diggs

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation		✓		✓				✓	
11- Janitor's Closet	Domestic water fitting trowelled-on insulation		✓		✓				✓	
12- Offices, Health Suite, and Lounge	Heating system preformed pipe insulation		✓		✓				✓	
	Heating system fitting trowelled-on insulation		✓		✓				✓	
	Domestic water fitting trowelled-on insulation		✓		✓				✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 10/3/89 SURVEYOR: Roland M. Diggs

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Vinyl asbestos tile		✓		✓				✓	
13- Library	Vinyl asbestos tile		✓		✓				✓	

AHERA ACTIONS

Project Name: Mount Washington ES # 221

Project Start: 4-13-90 Project End: 4-17-90

Reason for the Action:

Patch + Repair

Written Description of Action and Methods:

SEE DAILY JOB REPORT

Name and Address of Contractor:

Marcor of Maryland Licence Number M21-003-005

Hunt Valley, Maryland 21030

State of Accreditation: Maryland

Accreditation Number: Chris Christian (President) 90-1001, 89-1860

Date of Expiration: May 8, 1991, May 5, 1989

List of Employees on job, Accreditation Numbers and Expiration date:

Elmer Johnson Harry Goode

Eric Tucker Amos Tomlin

mark Jones Keith Jones

Joyce Beal Rick Eikenberg

George Uzzle

Location of Disposal site, Waste Manifest Included:

PRICHARD LANDFILL # 2191

PRICHARD, W. VA.

☒ T & M
☐ CONTRACT
CUSTOMER JOB # _____
CHARGE No.: _____

LOCATION DESCRIPTION: 1st, 2nd, and 3rd Floors

DAILY JOB REPORT

Page 1 of 1

JOB NUMBER BA0991 DAY Friday DATE 4-13-90

JOB NAME Hoover Washington Elem. #221 ADDRESS 1801 Salgrave Ave. SUPERVISOR Elmer Johnson

EMPLOYEE (LIST EACH EMPLOYEE'S START & STOP TIMES)

Elmer Johnson	Sup.	07:30	16:00	8
Eric Tucker	Tech.	07:30	16:00	8
Mark Jones	Tech.	07:30	16:00	8
Joyce Beal	Tech.	07:30	16:00	8
George Izzle	Tech.	07:30	16:00	8
Harry Goode	Tech.	07:30	16:00	8
AIR TECH NAME: Randy Kimmett	I.H.	7:30	16:00	8

EMPLOYEE SIGNATURE

Elmer Johnson
Eric Tucker
Mark Jones
J. Beal
George Izzle
Harry Goode

AIR TECH SIGNATURE: R. Kimmett

MATERIAL RECEIVED

ITEM	QTY.	ITEM	QTY.	ITEM	QTY.
Bags	3/4 cs	Glue	5 cans	Surfac.	3/4
81 Bags		L. Bulbs		Tape	11 Rolls
82 Bags		Mop Heads		32-20	
G. Bags		Paint		32-21	
Lrg. Box Filt.	6	Pins		32-22	1 gal
Sm. Box Filt.		Poly	1/2 roll	32-32	1 gal
P. Brushes	2	Lrg. Pre. Filt.	9	Towels	
W. Brushes	2	Sm. Pre. Filt.		Sm. Tubes	
Cassettes	1	Propane		Varsol	
Drums		Rags	30 lbs		
Ex. Duct	3/4 roll	Rewet.	1/2 roll		
84-18		Ribbon	1/2 roll		
Comfo. Fil.		Scrapers			
PAPR. Fil.		Signs	10		
Fab. Glass		Stickers			
Gloves		Suits	44		

MATERIAL USED

ITEM	QTY.	ITEM	QTY.	ITEM	QTY.
Bags	24	Glue	1	Surfac.	1 qt.
81 Bags		L. Bulbs		Tape	4 Rolls
82 Bags		Mop Heads		32-20	
G. Bags		Paint		32-21	
Lrg. Box Filt.		Pins		32-22	1/2 gal
Sm. Box Filt.		Poly	25 ft	32-32	1/2 gal
P. Brushes	2	Lrg. Pre. Filt.		Towels	
W. Brushes	2	Sm. Pre. Filt.		Sm. Tubes	
Cassettes	1	Propane		Varsol	
Drums		Rags	5 lbs		
Ex. Duct		Rewet.	2 3/4 ft		
84-18		Ribbon	30 ft		
Comfo. Fil.		Scrapers			
PAPR. Fil.		Signs	5		
Fab. Glass		Stickers			
Gloves		Suits	12		

TIME OF DELIVERY: DELIVERED BY: MILEAGE:

EQUIPMENT ON PROJECT

ITEM	QTY.	I.D. No.:	ITEM	QTY.	I.D. No.:	ITEM	QTY.	I.D. No.:
Chain			Nozzle			Airlss. Sp.		
Drill			Air Pump	1	AMK-16	Squeegie	1	
Ext. Cord	3		Shwr. Pump			3 Stage		
Gang Box			Sawzall			Filt Unit		
Generator			Scaffold			N.A. Unit	4	#4 #74 #45 #9
Hnd. Sprayr.	1		Scrw. Gun			81 Vac	3	#51 #17 #57
Hose			Shovel			82 Vac	2	#16 #6
Ladders	3	1-6' 2-8'	Shower			W/D Vac	1	#35
Str. Lts.			MISC.			Owner's or Representative's Signature:		
Locks						Supervisor's Signature:		Elmer Johnson
Mop Set	1							

-OVER-

DEFINED WORK AREAS: 1st Floor; Incinerator Rm, Utility Rm, Rm 3, and hallway 2nd Floor: Boys bathroom, Rm 104 closet area, 101 Rm, Men bathroom, Heath area, Rm 105, Stage area 3rd Floor: Utility Rm

SPECIFIC WORK PERFORMED:

Each area listed was setup, signs posted, and asbestos labeled ribbon was used to block-off hallways and stairways exits. Myself and I.H. Services inspected all work areas and I.H. Services approved each work area. ACM pipe insulation and asbestos elbows were patched and repaired and painted with 3232 in each work area. The floors in each work area were hepa vacuum and wet wipped with a mop. Each work area was checked visually by myself, and I.H. Services and I.H. Services approved the work which was done. I.H. Services ran final air samples in each work area. Final air samples passed in all work areas.

AIR MONITORING COMPANY: I. H. Services

QTY. REMOVED: Patch and Repair

GENERAL COMMENTS:

SPECIAL NOTES, VISITORS TO SITE & MISC. AREAS

AMOUNT OF DISPOSAL: 12 Bags	ASBESTOS IN WORK AREA NOT PART OF SCOPE: ☑ YES ☐ NO
PRESSURE DIFFERENTIAL READING: N/A	ASBESTOS HANDLED BY OTHERS: ☐ YES ☑ NO
SAMPLING INFORMATION (AIR/BULK)	IF YES, FILL OUT FORM
SAMPLE TYPE / QUANT. / SAMPLE No. / RESULT	VISITORS TO SITE: NONE
PRELIM.	
I.W.A.	
O.W.A.	
PERSONAL / MW 221	DELAY: ☐ YES ☑ NO BY WHOM:
BULK	MAN HOURS LOST:
FINAL 12 FINALS ALL <0.010 f/cc	REASON FOR DELAY:
VERIFICATION BY WHOM: R. KIMMELL	
☑ VERBAL ☐ WRITTEN	
DATE: 4-13-90 TIME: 1545 HRS	

DETAILED WORK AREAS: 1st Floor: Incinerator rm, Utility rm, rm 3, and hallway 2nd Floor: Boys bathroom, Rm 104 closet area, 101 rm, Men bathroom, Heath area, rm 105, Stage area 3rd Floor: Utility rm

SPECIFIC WORK PERFORMED:

Each area listed was setup, signs posted, and asbestos labeled ribbon was used to block-off hallways and stairways exits. Myself and I.H. Services inspected all work areas and I.H. Services approved each work area. ACM pipe insulation and asbestos elbows were patched and repaired and painted with 3232 in each work area. The floors in each work area were hepa vacuum and wet wipped with a mop. Each work area was checked visually by myself and I.H. Services and I.H. Services approved the work which was done. I.H. Services ran final air samples in each work area. Final air samples passed in all work areas.

AIR MONITORING COMPANY: I. H. Services

OTHER MOVED: Patch and Repair

GENERAL COMMENTS:

SPECIAL NOTES/VISITORS TO SITE/MISCELLANEOUS

AMOUNT OF DISPOSAL: 12 Bags	ASBESTOS IN WORK AREA NOT PART OF SCOPE: ☑ YES ☐ NO
PRESSURE DIFFERENTIAL READING: N/A	ASBESTOS HANDLED BY OTHERS: ☐ YES ☑ NO
SAMPLING INFORMATION (AIR/BULK)	IF YES, FILL OUT FORM
SAMPLE TYPE QUANT. SAMPLE No. RESULT	VISITORS TO SITE: NONE
PRELIM.	
I.W.A.	
O.W.A.	
PERSONAL 1 MW 221	DELAY: ☐ YES ☑ NO BY WHOM:
BULK	MAN HOURS LOST:
FINAL 12 FINALS ALL <0.010 f/cc	REASON FOR DELAY:
VERIFICATION BY WHOM: R. KIMMET	
☑ VERBAL ☐ WRITTEN	
DATE: 4-13-90 TIME: 1545 HRS	

☒ T & M
☐ CONTRACT
CUSTOMER JOB # _____
CHARGE No.: _____

LOCATION DESCRIPTION: Boiler Rm

DAILY JOB REPORT

Page 1 of 1

JOB NUMBER B#0991 DAY Monday DATE 4-16-90

JOB NAME Mount Washington Elem. ADDRESS 1804 Sulgrave Ave. SUPERVISOR Elmer Johnson

EMPLOYEE	TITLE	START	STOP	HRS	EMPLOYEE SIGNATURE
Elmer Johnson	Sup.	07:30	16:00	8	Elmer Johnson
Joyce Beal	Tech.	07:30	16:00	8	J. Beal
Eric Tucker	Tech.	07:30	16:00	8	Eric Tucker
George Uzzle	Tech.	07:30	16:00	8	George Uzzle
Mark Jones	Tech.	07:30	16:00	8	Mark Jones
Harry Goode	Tech.	07:30	16:00	8	Harry Goode
Amos Tomlin	Tech.	07:30	16:00	8	Amos C. Tomlin
Keith Jones	Sup.	07:30	16:00	8	Keith Jones
Rick Eikenberg	Super	07:30	16:00	8	
GARDNER PARKS	A.O.M	8:30	10:00	1.5	Gardner Parks
AIR TECH NAME: RANDY KIMMETT	J.H.	9:30	4:00	6.5	AIR TECH SIGNATURE: R. Kimmett

MATERIAL RECEIVED

ITEM	QTY.	ITEM	QTY.	ITEM	QTY.
Bags	1/5	Glue	1/6	Surfac.	1 gal
81 Bags		L. Bulbs		Tape	1 cart 3M
82 Bags		Mop Heads	1	32-20	
G. Bags		Paint		32-21	
Lrg. Box Filt.	6	Pins		32-22	1 gal
Sm. Box Filt.		Poly	1 RL	32-32	2 gal
P. Brushes	2	Lrg. Pre. Filt.	9	Towels	
W. Brushes	2	Sm. Pre. Filt.		Sm. Tubes	
Cassettes	1	Propane		Varsol	
Drums		Rags	27 lbs		
Ex. Duct	3/4 Rl	Rewet.	1/2 Rl		
84-18		Ribbon	1/2 Rl		
Comfo. Fil.		Scrapers			
PAPR. Fil.		Signs	5		
Fab. Glass		Stickers			
Gloves		Suits	28		

MATERIAL USED

ITEM	QTY.	ITEM	QTY.	ITEM	QTY.
Bags	6	Glue		Surfac.	9+ Scrolls
81 Bags		L. Bulbs		Tape	
82 Bags		Mop Heads	1	32-20	
G. Bags		Paint		32-21	
Lrg. Box Filt.		Pins		32-22	1/2 gal
Sm. Box Filt.		Poly	20 lbs	32-32	2 gal
P. Brushes	2	Lrg. Pre. Filt.		Towels	
W. Brushes	2	Sm. Pre. Filt.		Sm. Tubes	
Cassettes	1	Propane		Varsol	
Drums		Rags	7 lbs		
Ex. Duct		Rewet.	1/2 Rl		
84-18		Ribbon			
Comfo. Fil.		Scrapers			
PAPR. Fil.		Signs	3		
Fab. Glass		Stickers			
Gloves		Suits	27		

TIME OF DELIVERY: DELIVERED BY: MILEAGE:

EQUIPMENT ON PROJECT

ITEM	QTY.	I.D. No.:	ITEM	QTY.	I.D. No.:	ITEM	QTY.	I.D. No.:
Chain			Nozzle			Airlss. Sp.		
Drill			Air Pump	1	AMK-16	Squeegie	1	
Ext. Cord	3		Shwr. Pump			3 Stage		
Gang Box			Sawzall			Filt Unit		
Generator			Scaffold			N.A. Unit	4	#74 #9 #4 #65
Hnd. Sprayr.	1		Scrw. Gun			81 Vac	3	#51 #17 #57
Hose			Shovel			82 Vac	2	#16 #6
Ladders	3	1-6' 2-8'	Shower			W/D Vac	1	#35
Str. Lts.			MISC.			Owner's or Representative's Signature:		
Locks						Supervisor's Signature: Elmer Johnson		
Mop Set	1							

-OVER-

DEFINED WORK AREA(S): Boiler Room

SPECIFIC WORK PERFORMED: I had the technicians to setup barriers, seal off vents, doors, and posts signs. Hallway leading to the boiler room was blocked off with danger asbestos ribbon. I. H. Services and myself checked the setup, and I. H. Services approved the setup. ACM pipe insulation, boiler tanks, and asbestos elbows were being patched and repaired with rewettable and painted with 3232. Work area was 2/3 of the way completed by the end of the shift.

AIR MONITORING COMPANY: I. H. Services

QTY REMOVED: Patch and Repair

GENERAL COMMENTS:

MISCELLANEOUS

AMOUNT OF DISPOSAL: 3 bags	ASBESTOS IN WORK AREA NOT PART OF SCOPE: ☑ YES ☐ NO
PRESSURE DIFFERENTIAL READING: N/A	ASBESTOS HANDLED BY OTHERS: ☐ YES ☑ NO
SAMPLING INFORMATION (AIR/BULK)	IF YES, FILL OUT FORM
SAMPLE TYPE QUANT. SAMPLE No. RESULT	VISITORS TO SITE: Gardner Parks
PRELIM.	
I.W.A.	
O.W.A.	
PERSONAL 1 MW-1	DELAY: ☐ YES ☑ NO BY WHOM:
BULK	MAN HOURS LOST:
FINAL N/A	REASON FOR DELAY:
VERIFICATION BY WHOM: N/A	
☐ VERBAL ☐ WRITTEN	
DATE: TIME:	

DEFINE WORK AREA: Boiler Room

SPECIFIC WORK PERFORMED: I had the technicians to setup barriers, seal off vents, doors, and posts signs. Hallway leading to the boiler room was blocked off with danger asbestos ribbon. I. H. Services and myself checked the setup, and I. H. Services approved the setup. ACM pipe insulation, boiler tanks, and asbestos elbows were being patched and repaired with rewettable and painted with 3232. Work area was 2/5 of the way completed by the end of the shift.

AIR MONITORING PERFORMED: I. H. Services

QA REMARKS: Patch and Repair

GENERAL COMMENTS:

SPECIAL NOTES: VISITORS TO SITE & MISCELLANEOUS

AMOUNT OF DISPOSAL: 3 bags	ASBESTOS IN WORK AREA NOT PART OF SCOPE: ☑ YES ☐ NO
PRESSURE DIFFERENTIAL READING: N/A	ASBESTOS HANDLED BY OTHERS: ☐ YES ☑ NO
SAMPLING INFORMATION (AIR/BULK)	IF YES, FILL OUT FORM
SAMPLE TYPE QUANT. SAMPLE No. RESULT	VISITORS TO SITE: Gardner Parks
PRELIM.	
I.W.A.	
O.W.A.	
PERSONAL 1 MW-1	DELAY: ☐ YES ☑ NO BY WHOM:
BULK	MAN HOURS LOST:
FINAL N/A	REASON FOR DELAY:
VERIFICATION BY WHOM: N/A	
☐ VERBAL ☐ WRITTEN	
DATE: TIME:	

☒ T & M
☐ CONTRACT
CUSTOMER JOB # _____
CHARGE No.: _____

LOCATION DESCRIPTION: Boiler room and office in the Boiler room

DAILY JOB REPORT

Page 1 of 1

JOB NUMBER BA0991 DAY Tuesday DATE 4-17-90

JOB NAME Mount Washington #221 ADDRESS 1804 Sulgrave Ave SUPERVISOR Elmer Johnson

EMPLOYEE	STATUS	START	STOP	HRS.	EMPLOYEE SIGNATURE
Elmer Johnson	Sup.	07:30	16:00	8	Elmer Johnson
Joyce Beal	Tech.	07:30	16:00	8	J Beal
Eric Tucker	Tech.	07:30	16:00	8	Eric Tucker
George Uzzle	Tech.	07:30	16:00	8	[illegible]
Mark Jones	Tech.	07:30	16:00	8	[illegible]
Harry Goode	Tech.	07:30	16:00	8	[illegible]
Amos Tomlin	Tech.	07:30	12:40	5.25	Amos C. Tomlin
GARDNER PARKS	A.O.M	13:00	14:00	1	Gardner Parks
AIR TECH NAME: Kmain Evans	I.H.	7:30	16:05	8	AIR TECH SIGNATURE: [illegible]

MATERIAL RECEIVED

ITEM	QTY.	ITEM	QTY.	ITEM	QTY.
Bags	1.2 cs	Glue	1/2 cs	Surfac.	3/4 gal
81 Bags		L. Bulbs		Tape	1 cs
82 Bags		Mop Heads	1	32-20	
G. Bags		Paint		32-21	
Lrg. Box Filt.	6	Pins		32-22	1/2 gal
Sm. Box Filt.		Poly	1 Roll	32-32	10 gal
P. Brushes	2	Lrg. Pre. Filt.	9	Towels	
W. Brushes	2	Sm. Pre. Filt.		Sm. Tubes	
Cassettes	1	Propane		Varsol	
Drums		Rags	20 lb		
Ex. Duct	3 roll	Rewet.	1 all		
84-18		Ribbon	1.1 roll		
Comfo. Fil.		Scrapers			
PAPR. Fil.		Signs	5		
Fab. Glass		Stickers			
Gloves		Suits	51		

MATERIAL USED

ITEM	QTY.	ITEM	QTY.	ITEM	QTY.
Bags	18	Glue		Surfac.	1/2 qt
81 Bags		L. Bulbs		Tape	3 rolls
82 Bags		Mop Heads	1	32-20	
G. Bags		Paint		32-21	
Lrg. Box Filt.		Pins		32-22	1 qt
Sm. Box Filt.		Poly	15 ft	32-32	1/2 gal
P. Brushes	2	Lrg. Pre. Filt.		Towels	
W. Brushes	2	Sm. Pre. Filt.		Sm. Tubes	
Cassettes	1	Propane		Varsol	
Drums		Rags	1 lb		
Ex. Duct		Rewet.	55 sq ft		
84-18		Ribbon			
Comfo. Fil.		Scrapers			
PAPR. Fil.		Signs			
Fab. Glass		Stickers			
Gloves		Suits	15		

TIME OF DELIVERY: DELIVERED BY: MILEAGE:

EQUIPMENT ON PROJECT

ITEM	QTY.	I.D. No.:	ITEM	QTY.	I.D. No.:	ITEM	QTY.	I.D. No.:
Chain			Nozzle			Airlss. Sp.		
Drill			Air Pump	1	AHK-16	Squeegie	1	
Ext. Cord	3		Shwr. Pump			3 Stage		
Gang Box			Sawzall			Filt Unit		
Generator			Scaffold			N.A. Unit	4	#4 #74 #9 #45
Hnd. Sprayr.	1		Scrw. Gun			81 Vac	3	#51 #17 #57
Hose			Shovel			82 Vac	2	#16 #6
Ladders	3	1-6' 2-8'	Shower			W/D Vac	1	#35
Str. Lts.			MISC.			Owner's or Representative's Signature:		
Locks						Supervisor's Signature:		Elmer Johnson
Mop Set	1							

-OVER-

DEFINE WORK AREAS: Boiler Room, Office area inside of boiler room

SPECIFIC WORK PERFORMED: ACM pipe insulation and asbestos elbows were completed being patched and repaired with rewettable and painted with 3232 in the boiler room, and office area inside the boiler room. The floor was hepa vacuum, and wet mopped. I.H. Services inspected the boiler room, and the office area inside the boiler room. Visual inspection passed in each area. I.H. Services ran final air samples. Final air samples passed. All barriers, signs, and ribbon were taken down and doubled bagged.

AIR MONITORING COMPANY: I.H. Services

QTY REMOVED: Patch and Repair

GENERAL COMMENTS:

SPECIAL NOTES

AMOUNT OF DISPOSAL: 9 bags	ASBESTOS IN WORK AREA NOT PART OF SCOPE: ☑ YES ☐ NO
PRESSURE DIFFERENTIAL READING:	ASBESTOS HANDLED BY OTHERS: ☐ YES ☑ NO
SAMPLING INFORMATION (AIR/BULK)	IF YES, FILL OUT FORM
SAMPLE TYPE QUANT. SAMPLE No. RESULT	VISITORS TO SITE: Gardner Parks
PRELIM.	
I.W.A.	
O.W.A.	
PERSONAL 1 MW-2	DELAY: ☐ YES ☑ NO BY WHOM:
BULK	MAN HOURS LOST:
FINAL <0.010	REASON FOR DELAY:
VERIFICATION BY WHOM: Kimberly Evans	
☑ VERBAL ☐ WRITTEN	
DATE: 4/17/00 TIME: 14:00	

DESIGNATED WORK AREA(S): Boiler Room, Office area inside of boiler Room

SPECIFIC WORK PERFORMED: ACM pipe insulation and asbestos elbows were completed being patched and repaired with rewettable and painted with 3232 in the boiler room, and office area inside the boiler room. The floor was hepa vacuum, and wet mopped. I. H. Services inspected the boiler room, and the office area inside the boiler room. Visual inspection passed in each area. I. H. Services ran final air samples. Final air samples passed. All barriers, signs, and ribbon were taken down and doubled bagged.

AIR MONITORING COMPANY: I. H. Services

QTY REMOVED: Patch and Repair

GENERAL COMMENTS:

SPECIAL NOTES / UNUSUAL OCCURRENCES / MISCELLANEOUS

AMOUNT OF DISPOSAL: 9 bags	ASBESTOS IN WORK AREA NOT PART OF SCOPE: ☑ YES ☐ NO
PRESSURE DIFFERENTIAL READING:	ASBESTOS HANDLED BY OTHERS: ☐ YES ☑ NO
SAMPLING INFORMATION (AIR/BULK)	IF YES, FILL OUT FORM
SAMPLE TYPE QUANT. SAMPLE No. RESULT	VISITORS TO SITE: Gardner Parks
PRELIM.	
I.W.A.	
O.W.A.	
PERSONAL 1 MW-2	DELAY: ☐ YES ☑ NO BY WHOM:
BULK	MAN HOURS LOST:
FINAL <0.010	REASON FOR DELAY:
VERIFICATION BY WHOM: Kimberly Evans	
☑ VERBAL ☐ WRITTEN	
DATE: 4/17/90 TIME: 14:00	

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. 5 2 1 4 9 5 8 5 2 | Manifest Document No. 2 1 9 1 | 2. Page 1 of

3. Generator's Name and Mailing Address

SEE BELOW

4. Generator's Phone ( )

P.O.# 3766

5. Transporter 1 Company Name: United Compactors, Inc. | 6. US EPA ID Number

7. Transporter 2 Company Name | 8. US EPA ID Number

9. Designated Facility Name and Site Address: Prichard Landfill Corp. 5835 Big Sandy River Rd. Prichard, W.V. 25555 | 10. US EPA ID Number

A. Transporter's Phone
B. Transporter's Phone
C. Facility's Phone

11. Waste Shipping Name and Description: 49 yd. warehouse

	12. Containers No.	Type	13. Total Quantity	Unit Wt/Vol
a. BA0-100 Warehouse	4	bags		
BA0-994 Baltimore City Police Dept.	4	bags		
BA0-114 Strathmore Elementary	13	bags		
b. BA0-118 Towson State University Lida Lee Hall	46	bags		
BA0-117 Towson State University	20	bags		
BA0-100 Warehouse	3	bags-5 hepa filters		
c.	1	drum		
BA0-987 Harbor City Training Ctr.# 413	49	bags		
BA0-111 E.B.Woods Middle School	58	bags		
d. BA0-989 Steuart Hill # 4	1	bag		
BA0-104 Royes Williams Elementary	52	bags		
BA0-112 Rockville High School	105	bags		

D. Additional Descriptions for Materials Listed Above

E. Handling Codes for Wastes Listed Above

BA0-111 E.B.Woods Middle School	114	bags
BA0-977 Carver Vo-tech	60	bags
BA0-983 Edmondson High School	53	bags
BA0-990 Westside Elementary # 24	3	bags

15. Special Handling Instructions and Additional Information

BA0-892 Firestone	3	bags
BA0-988 Mt.Royal Elementary & Middle School	4	bags
BA0-104 Royes Williams Elementary	130	bags
BA0-577 McGruder High School	5	bags
BA0-991 Mt.Washington Elementary	25	bags

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazard Waste.

Printed/Typed Name: Marcor of Md. | Signature | Month 04 | Day 18 | Year 90

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: United Compactors, Inc. | Signature | Month 04 | Day 18 | Year 90

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Month | Day | Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name: Brenda Meade | Signature: Brenda Meade | Month 4 | Day 20 | Year 90

GENERATOR

TRANSPORTER

FACILITY

ORIGINAL — RETURN TO GENERATOR

AHERA ACTIONS I.H. INFORMATION

Name of person collecting air sample: R. Kimmett, Kimathi Evans

Signature:

Date: 4-13-90 — 4-17-90

Location: Mount Washington ES #221

Name and address of analyzing lab:

I H Services, Inc., 1521 Edgewood Street, Baltimore, Md., 21224

Date of Analysis: 4-13-90 — 4-17-90

Method: NIOSH 7400

Results: See Data Sheets

Name of Analysis: R. Kimmett

Signature:

Statement that Lab. meets applicable requirements:

IH Services, meets the applicable requirements of 40 CFR Part 763 Section 763.90 (i) (2) (ii). The American Idustrial Hygiene Association Proficiency Analytical Testing Laboratory number is 21224-002. All other laboratories used by IH Services, Inc., for the analysis of samples also meet the applicable requirements of 40 CFR Part 763 Section 763.90 (i) (2) (ii)

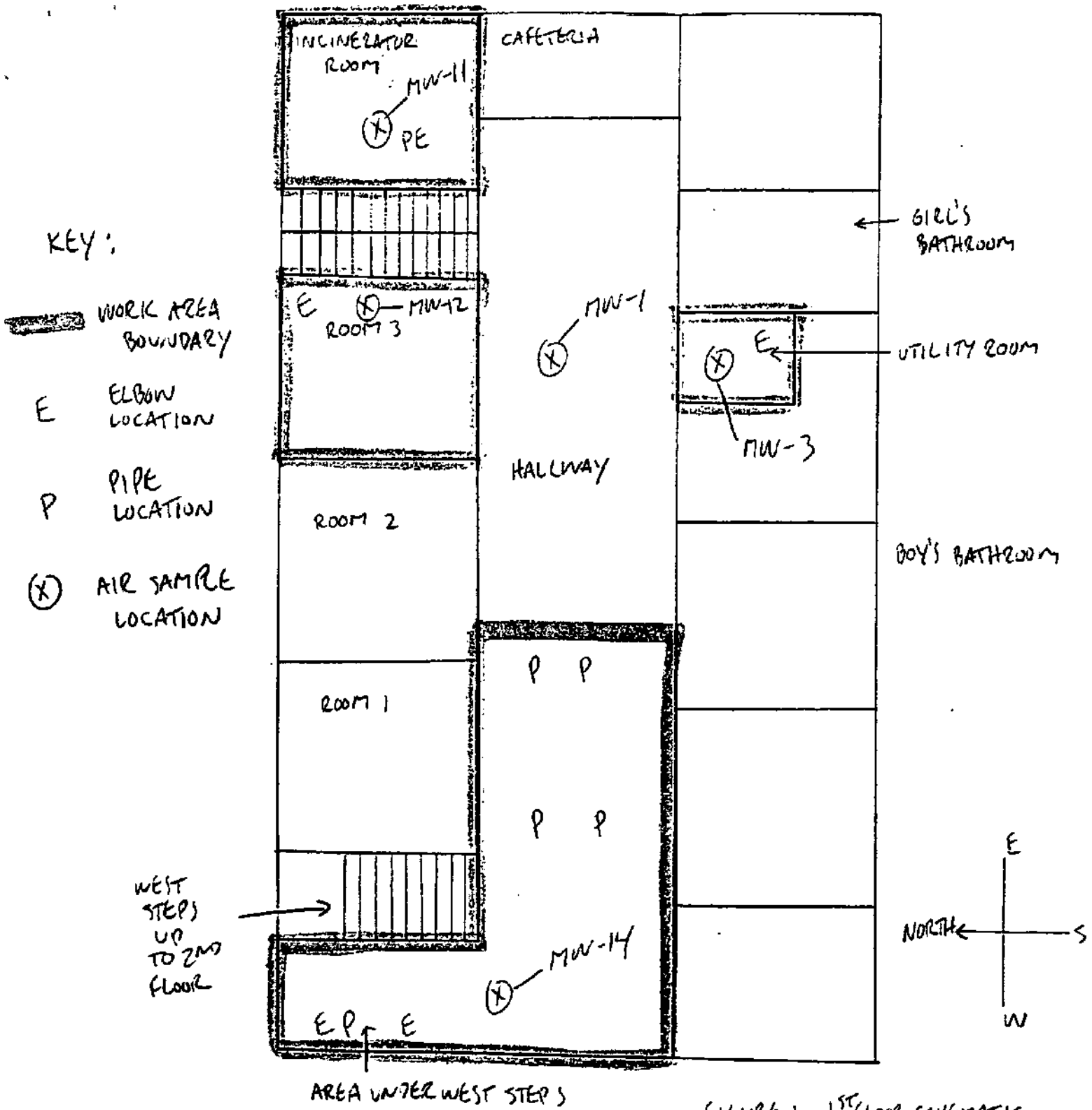


FIGURE 1. 1ST FLOOR SCHEMATIC

MOUNT WASHINGTON ELEMENTARY SCHOOL NO. 221

1801 SULGRAVE AVE.

BALTO. MD 21209

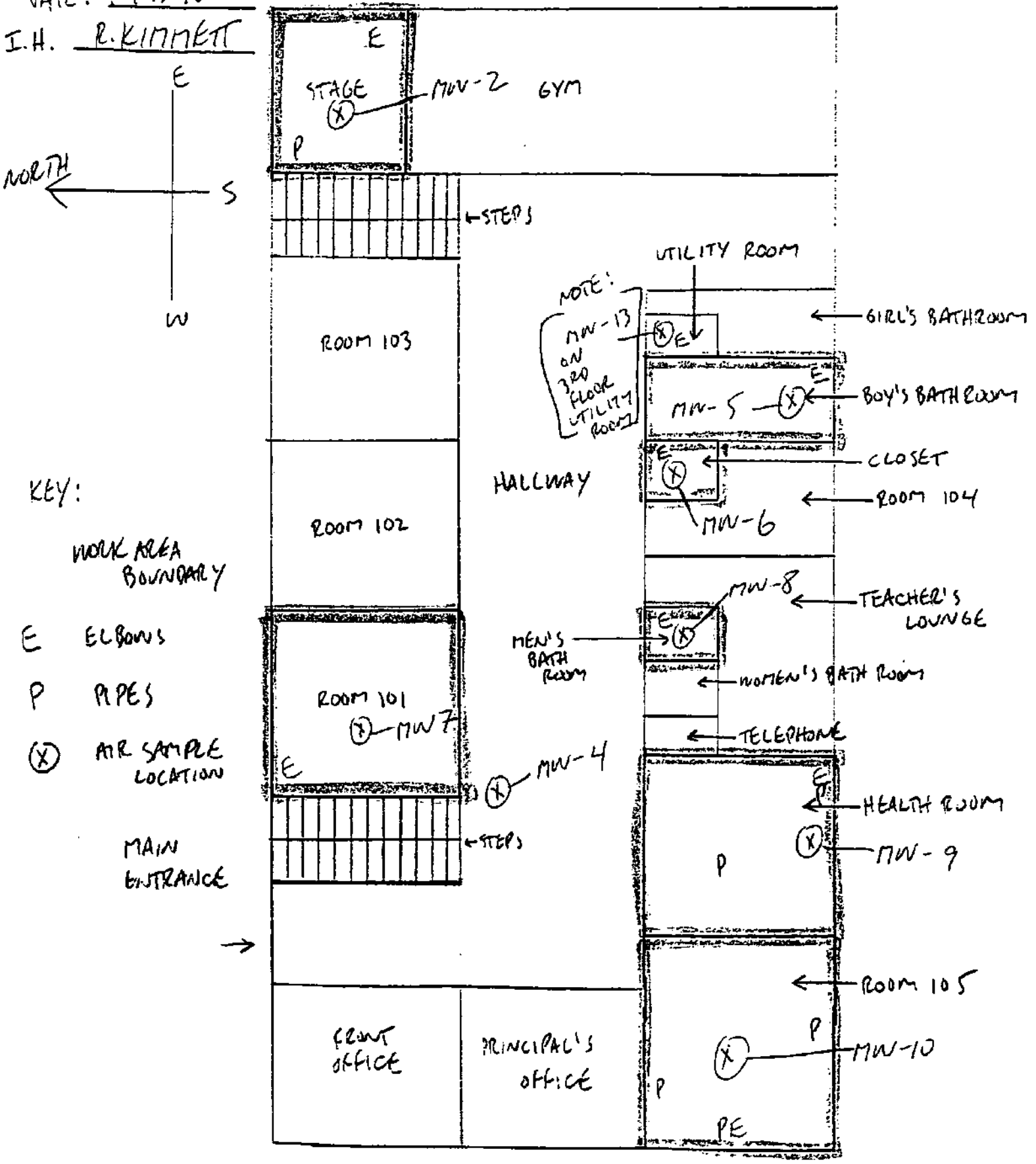
I.H.: R. KIMMETT DATE: 4-17-90

I H SERVICES, INC.

FIGURE 2. 2ND FLOOR SCHEMATIC
MOUNT WASHINGTON ELEMENTARY SCHOOL NO. 221
1801 SULGRAVE AVE, BALTO. MD 21209

DATE: 4-13-90

I.H. R. KIMMETT



KEY:

WORK AREA BOUNDARY

E ELBOWS

P PIPES

(X) AIR SAMPLE LOCATION

I H SERVICES, INC.

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

P. 1 of 3

AIR MONITORING DATA SHEET

Project: MOUNT WASHINGTON ELEM. NO. 221
Address: 1801 SULGRAVE AVE BALTO. MD 21209
Date: 4-13-90
Activity: PATCH & REPAIR VARIOUS ELBOWS
Job Number: BAO-991
Work Order Number:

SAMPLED FOR:

- [x] Asbestos: METHOD [x] 7400 [ ] TEM; CASSETTE [x] 25mm [ ] 37mm; LACTER [x] MCE [ ] PC
- [ ] Airborne Dust:
- [ ] Gas:
- [ ] Vapor:
- [ ] Other:

Analytical Method: _____ Ambient Temp.: _____

Protection Worn During Sampling:

	Employee	IH
Full Body Coveralls	[x]	[x]
Respirator - Air Purifying	[x]	[x]
Respirator - Power Air Purifying	[ ]	[ ]
Respirator - Supplied Air	[ ]	[ ]

PERSONAL SAMPLING DATA

Employee Sampled: N/A
Social Security Number:
Smoker: [ ] Yes [ ] No
Job Function:
Description of Activity:

Signature of Employee:

LAB ID	SAMPLE NO.	SAMPLE DATE	RESULTS FIBERS/CC	SAMPLE LOCATION
5893	MW-1	4-13-90	0.022	OUTSIDE WORK AREA - IN HALLWAY ADJACENT TO ROOM 3, ~5'h
5894	MW-2	"	<0.005	WORK AREA FINAL - ADJ. TO W WALL - STAGE AREA, ~5'h.
5895	MW-3	"	<0.010	WORK AREA FINAL - UTILITY ROOM ACROSS FROM ROOM NO. 3, 1ST FLOOR ~5'h.
5896	MW-4	"	<0.005	OUTSIDE WORK AREA - 2ND FLOOR HALL - ADJ. TO W. STAIRS, ~5'h.
5897	MW-5	"	<0.010	WORK AREA FINAL - BOYS BATHROOM 2ND FLOOR ALONG S. WALL, ~5'h.
5898	MW-6	"	<0.010	WORK AREA FINAL - CLOSET ROOM 104, CENTER OF ROOM, ~5'h.
5899	MW-7	"	<0.010	WORK AREA FINAL - ROOM 101 CENTER, ~5'h.

FIELD SAMPLE NUMBER	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING (LITERS/MIN.) START	FLOW RATE SETTING (LITERS/MIN.) STOP	VOLUME LITERS	SAMPLE TYPE AMBIENT	SAMPLE TYPE AREA	SAMPLE TYPE FINAL	SAMPLE TYPE PERSONAL	SAMPLE LOCATION IH WORK AREA	SAMPLE LOCATION OUTSIDE WORK AREA	SAMPLE LOCATION N/A	INSTRUMENT SERIAL NUMBER
MW-1	0820	0900	40	12.0	12.0	480		✓				✓		0988-A
MW-2	0900	1130	150	3.2	3.2	480		✓	✓		✓			MSA-3
MW-3	0905	0950	45	12.0	12.0	540		✓	✓		✓			0988-A
MW-4	1000	1200	120	12.0	12.0	1440		✓				✓		0988-C
MW-5	1000	1435	275	3.2	3.2	880		✓	✓		✓			MSA-11
MW-6	0955	1040	45	12.0	12.0	540		✓	✓		✓			0988-A
MW-7	1045	1125	40	12.0	12.0	480		✓	✓		✓			0988-A

Comments:

Inspector: R. KIMMETT (PRINT NAME)
R. Kimmett (SIGNATURE)
Date: 4-13-90

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

P. 2 of 3

AIR MONITORING DATA SHEET

Project: MOUNT WASHINGTON ELEM. NO. 221
Address: 1801 SULGRAVE AVE, BALTO. MD 21209
Date: 4-17-90
Activity: PATCH & REPAIR VARIOUS ELBOWS
Job Number: BAO-991
Work Order Number:

SAMPLED FOR:

- [x] Asbestos: METHOD [x] 7400 [ ] TEM; CASSETTE [x] 25mm [ ] 37mm; FILTER [x] MCE [ ] PC
- [ ] Airborne Dust:
- [ ] Gas:
- [ ] Vapor:
- [ ] Other:

Analytical Method: _____ Ambient Temp.: _____

Protection Worn During Sampling:

	Employee	IH
Full Body Coveralls	[x]	[x]
Respirator - Air Purifying	[x]	[x]
Respirator - Power Air Purifying	[ ]	[ ]
Respirator - Supplied Air	[ ]	[ ]

PERSONAL SAMPLING DATA

Employee Sampled: N/A
Social Security Number:
Smoker: [ ] Yes [ ] No
Job Function:
Description of Activity:

Signature of Employee:

LAB ID	SAMPLE NO.	SAMPLE DATE	RESULTS FIBERS/CC	SAMPLE LOCATION
5900	MW-8	4-13-90	<0.005	WORK AREA FINAL - MEN'S BATHROOM 2ND FLOOR, CENTER, ~5'h.
5901	MW-9	"	<0.010	WORK AREA FINAL - HEALTH ROOM, CENTER ADJ. TO S. WALL, ~5'h
5902	MW-10	"	<0.010	WORK AREA FINAL - ROOM 105, CENTER ~5'h.
5903	MW-11	"	<0.010	WORK AREA FINAL - INCINERATOR ROOM CENTER ~5'h.
5904	MW-12	"	0.009	WORK AREA FINAL - ROOM 3, 1ST FLOOR ADJ. ~~W.~~ E. WALL, ~5'h.
5905	MW-13	"	<0.005	WORK AREA FINAL - ADJACENT TO BOILER ROOM, UTILITY ROOM, 1ST FLOOR, CENTER, ~5'h.
5906	MW-14	"	<0.010	WORK AREA FINAL - 1ST FLOOR W. HALL AND MIDDLE HALL, CENTER ~5'h.

FIELD SAMPLE NUMBER	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING START (LITERS/MIN.)	FLOW RATE SETTING STOP (LITERS/MIN.)	VOLUME LITERS	SAMPLE TYPE AMBIENT	SAMPLE TYPE AREA	SAMPLE TYPE FINAL	SAMPLE TYPE PERSONAL	SAMPLE LOCATION IN WORK AREA	SAMPLE LOCATION OUTSIDE WORK AREA	SAMPLE LOCATION N/A	INSTRUMENT SERIAL NUMBER
MW-8	1130	1330	120	12.0	12.0	1440		✓	✓		✓			0988-A
MW-9	1335	1415	45	12.0	12.0	540		✓	✓		✓			0988-A
MW-10	1420	1510	50	12.0	12.0	600		✓	✓		✓			0988-A
MW-11	1140	1430	190	3.2	3.2	608		✓	✓		✓			MSA-3
MW-12	1200	1330	90	12.0	12.0	1080		✓	✓		✓			0988-C
MW-13	1340	1500	80	12.0	12.0	960		✓	✓		✓			0988-C
MW-14	1445	1535	50	12.0	12.0	600		✓	✓		✓			1189-A

Comments:

Inspector: R. KIMMETT (PRINT NAME)
R. [signature] (SIGNATURE)
Date: 4-17-90

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

P.1 of 3

AIR MONITORING DATA SHEET

Project: MOUNT WASHINGTON ELEM. NO. 221
Address: 1901 SULGRAVE AVE BALTO MD 21209
Date: 4-17-90
Activity: PATCH & REPAIR ELBOWS
Job Number: BAO-991
Work Order Number:

SAMPLED FOR:

- [x] Asbestos: METHOD [x] 7400 [ ] TEM CASSETTE [ ] 25mm [ ] 37mm FILTER [x] MCE [ ] PC
- [ ] Airborne Dust:
- [ ] Gas:
- [ ] Vapor:
- [ ] Other:

Analytical Method: Ambient Temp.:

Protection Worn During Sampling:

	Employee	IH
Full Body Coveralls	[ ]	[ ]
Respirator - Air Purifying	[ ]	[ ]
Respirator - Power Air Purifying	[ ]	[ ]
Respirator - Supplied Air	[ ]	[ ]

PERSONAL SAMPLING DATA

Employee Sampled:
Social Security Number:
Smoker: [ ] Yes [ ] No
Job Function:
Description of Activity:

Signature of Employee:

LAB ID	SAMPLE NO.	SAMPLE DATE	RESULTS FIBERS/CC	SAMPLE LOCATION
5913	MW-15	4-17-90	ZERO FIBERS PER 100 FIELDS	JOB SITE BLANK
5914	MW-16	"	"	LABORATORY BLANK

FIELD SAMPLE NUMBER	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING START (LITERS/MIN.)	FLOW RATE SETTING STOP	VOLUME LITERS	SAMPLE TYPE AMBIENT	SAMPLE TYPE AREA	SAMPLE TYPE FINAL	SAMPLE TYPE PERSONAL	SAMPLE LOCATION IN WORK AREA	SAMPLE LOCATION OUTSIDE WORK AREA	SAMPLE LOCATION N/A	INSTRUMENT SERIAL NUMBER
MW-15						0			✓				✓	
MW-16						0			✓				✓	

Comments:

Inspector: R. KINNETT (PRINT NAME)
R. KINNETT (SIGNATURE)
Date: 4-17-90

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

CHAIN OF CUSTODY FOR MICROSCOPY SERVICES

№ 0334

Submittal Date: 4-13-90 Submitted By: (Print) R. KIMMETT (Sign) R. Kimmett

Client Name: MACCOR of MD

Project Name: MOUNT WASHINGTON ELEM. NO. 221

Address:

Address: 1801 SULGRAVE AVE BALTO. MD 21209

Telephone: ( ) ON SITE

Contact Person: ELMER JOHNSON

Results Required By: 4 / 17 / 90

Before Noon? ☐ Yes ☒ No

Number of Samples: 14

Type of Samples: ☑ Air ☐ Bulk ☐ Wipe ☐ Other:

Release Criteria: ☐ AHERA ☑ 0.010 f/cc ☐ % Asbestos ☐ Other:

LAB ID	SAMPLE NUMBER	DATE	VOLUME (Liters)	METHOD (Check) PCM	PLM	TEM	SEM	OTHER
5893	MW-1	4-13-90	480	✓				
5894	MW-2		480	✓				FINAL
5895	MW-3		540	✓				FINAL
5896	MW-4		1440	✓				
5897	MW-5		880	✓				FINAL
5898	MW-6		540	✓				
5899	MW-7		480	✓				
5900	MW-8		1440	✓				
5901	MW-9		540	✓				
5902	MW-10		600	✓				
5903	MW-11		608	✓				
5904	MW-12		1080	✓				
5905	MW-13		960	✓				
5906	MW-14	↓	600	✓				↓

Relinquished By: (Signature)	Date	Relinquished By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time
Received By: (Signature)	Date	Received By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time

LABORATORY STAFF ONLY: (CUSTODY)

1. Date/Time Received 4 / 13 / 90 @ 1545 by (Print) R. KIMMETT Sign R. Kimmett
2. Date/Time Analyzed 4 / 13 / 90 @ 1600 by (Print) ↓ Sign ↓
3. Date/Time Reported 4 / 13 / 90 @ 1600 by (Print) ↓ Sign ↓
4. Results Reported To E. JOHNSON by (Print) ↓ Sign ↓

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

CHAIN OF CUSTODY FOR MICROSCOPY SERVICES

№ 0401

Submittal Date: 4-13-90 Submitted By: (Print) R. KIMMETT (Sign) R. Kimmett

Client Name: MARC of MD. Project Name: MT. WASH. ELEM. NO. 221

Address: Address: 1801 SULGRAVE AVE BALTO. MD 21209

Telephone: ( ) ON SITE Contact Person: ELMER JOHNSON

Results Required By: 4 / 13 / 90 Before Noon? ☐ Yes ☒ ~~No~~

Number of Samples: 2

Type of Samples: ☑ Air ☐ Bulk ☐ Wipe ☐ Other:

Release Criteria: ☐ AHERA ☑ 0.010 f/cc ☐ % Asbestos ☐ Other:

LAB ID	SAMPLE NUMBER	DATE	VOLUME (Liters)	METHOD (Check)				OTHER
				PCM	PLM	TEM	SEM	
5913	MW-15	4-10-90	0	✓				FINAL
5914	MW-16	↓	0	✓				↓

Relinquished By: (Signature)	Date	Relinquished By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time
Received By: (Signature)	Date	Received By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time

LABORATORY STAFF ONLY: (CUSTODY)

1. Date/Time Received 4 / 13 / 90 @ 1545 by (Print) R. KIMMETT Sign R. Kimmett
2. Date/Time Analyzed 4 / 13 / 90 @ 1600 by (Print) ↓ Sign R. Kimmett
3. Date/Time Reported 4 / 13 / 90 @ 1600 by (Print) ↓ Sign R. Kimmett
4. Results Reported To E. JOHNSON by (Print) ↓ Sign R. Kimmett

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

DAILY OBSERVATIONS

DATE: 4-16-90

INSPECTOR: R. KIMMETT

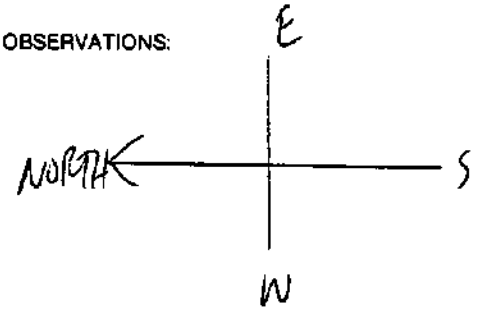
SITE: MT. WASHINGTON ELEM. NO. 221
1801 SULGRAVE AVE.
BALTO. MD 21209

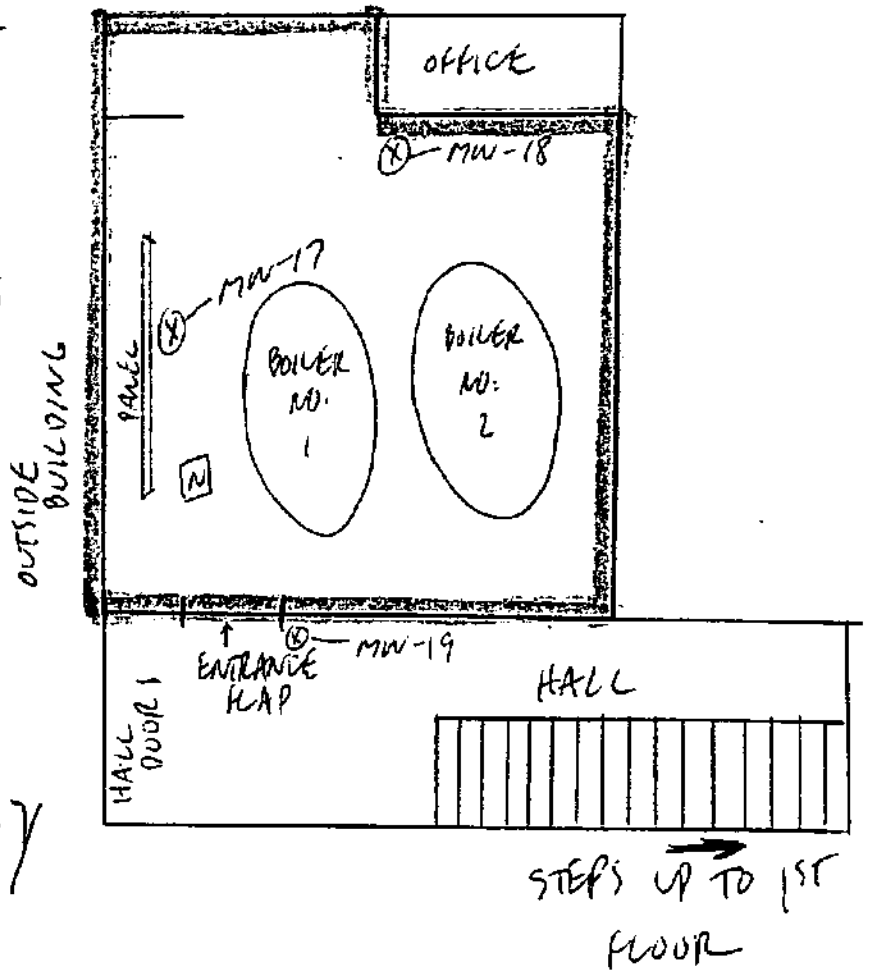
TITLE: I.H.

PURPOSE OF VISIT:

FIGURE 1. BOILER ROOM

GENERAL OBSERVATIONS:





KEY:

WORK AREA BOUNDARY

[N] NEGATIVE PRESSURE APPARATUS

(X) AIR SAMPLING LOCATION

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

AIR MONITORING DATA SHEET

Project: MOUNT WASHINGTON ELEMENTARY NO. 221
Address: 1801 SULGRAVE AVE., BALTO. MD 21209
Date: 4-16-90
Activity: PATCH & REPAIR BOILER ROOM
Job Number: BAO-991
Work Order Number:

SAMPLED FOR:

- [x] Asbestos: METHOD [x] 7400 [ ] TEM; CASSETTE [x] 25mm [ ] 37mm; FILTER [x] MCE [ ] PC
- [ ] Airborne Dust:
- [ ] Gas:
- [ ] Vapor:
- [ ] Other:

Analytical Method: Ambient Temp.:

Protection Worn During Sampling:

	Employee	IH
Full Body Coveralls	[x]	[x]
Respirator - Air Purifying	[x]	[x]
Respirator - Power Air Purifying	[ ]	[ ]
Respirator - Supplied Air	[ ]	[ ]

PERSONAL SAMPLING DATA

Employee Sampled: N/A
Social Security Number:
Smoker: [ ] Yes [ ] No
Job Function:
Description of Activity:

Signature of Employee:

LAB ID	SAMPLE NO.	SAMPLE DATE	RESULTS FIBERS/CC	SAMPLE LOCATION
5915	MW-17	4-16-90	<0.010	WORK AREA - ALONG N. WALL, CENTER ~5'h.
5916	MW-18	"	<0.010	WORK AREA - ALONG E. WALL, CENTER ~5'h.
5917	MW-19	"	<0.005	OUTSIDE WORK AREA - ATTACHED TO FLAP ENTRANCE, ~5'h.

FIELD SAMPLE NUMBER	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING START (LITERS/MIN.)	FLOW RATE SETTING STOP (LITERS/MIN.)	VOLUME LITERS	SAMPLE TYPE AMBIENT	SAMPLE TYPE AREA	SAMPLE TYPE FINAL	SAMPLE TYPE PERSONAL	SAMPLE LOCATION IN WORK AREA	SAMPLE LOCATION OUTSIDE WORK AREA	SAMPLE LOCATION N/A	INSTRUMENT SERIAL NUMBER
MW-17	0835	1125	170	3.5	3.5	595		✓			✓			MSA-3
MW-18	0836	1126	170	3.5	3.5	595		✓			✓			MSA-11
MW-19	0900	1120	140	12.0	12.0	1680		✓				✓		0988-A

Comments: WORK AREA DESIGNATED TO BE THE BOILER ROOM.

Inspector: R. KIMMET (PRINT NAME) R. Kimmet (SIGNATURE)

Date: 4-16-90

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

CHAIN OF CUSTODY FOR MICROSCOPY SERVICES

№ 0418

Submittal Date: 4-16-90 Submitted By: (Print) R. KIMMETT (Sign) R. Kimmett

Client Name: MARCOR OF MD

Address:

Telephone: ( ) ON SITE

Results Required By: 4, 16, 90

Number of Samples: 3

Project Name: MOUNT WASHINGTON ELEM. NO. 221

Address: 1801 SULGRAVE AVE. BALTO. MD 21209

Contact Person: ELMER JOHNSON

Before Noon? ☐ Yes ☑ No

Type of Samples: ☑ Air ☐ Bulk ☐ Wipe ☐ Other:

Release Criteria: ☐ AHERA ☑ 0.010 f/cc ☐ % Asbestos ☐ Other:

LAB ID	SAMPLE NUMBER	DATE	VOLUME (Liters)	METHOD (Check) PCM	PLM	TEM	SEM	OTHER
5915	MW-17	4-16-90	595	✓				
5916	MW-18	"	595	✓				
5917	MW-19	"	1680	✓				

Relinquished By: (Signature)	Date	Relinquished By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time
Received By: (Signature)	Date	Received By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time

LABORATORY STAFF ONLY: (CUSTODY)

1. Date/Time Received 4, 16, 90 @ 1400 by (Print) R. KIMMETT Sign R. Kimmett
2. Date/Time Analyzed 4, 16, 90 @ 1415 by (Print) R. KIMMETT Sign
3. Date/Time Reported 4, 16, 90 @ 1430 by (Print) " Sign
4. Results Reported To K. EVANS by (Print) " Sign

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

DAILY OBSERVATIONS

Page ____ of ____

DATE: 4/17/90

INSPECTOR: Kimathi Evans

SITE: M. Washington E.S. #221
1804 Sulgrave Ave. Balto. Md.

TITLE: Industrial Hygienist

PURPOSE OF VISIT:

Figure #1
Boiler Room

N

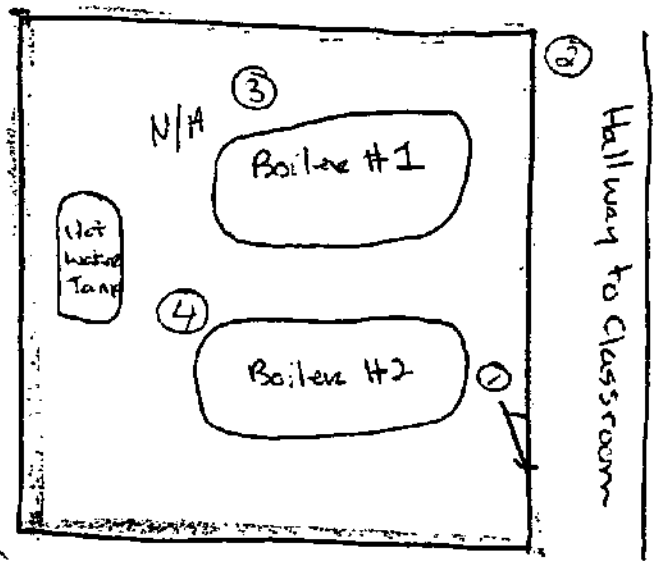
GENERAL OBSERVATIONS:

Key

[redacted] = Designated work area

N/A = Neg. Air Machine

MW-20 = ①
MW-21 = ②
MW-22 = ③ Final
MW-23 = ④ Final
MW-24 } Blanks Not shown
MW-25 }



I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

AIR MONITORING DATA SHEET

Project: M. Washington E.S. 221
Address: 1804 Sulgrave Ave Balto. Md
Date: 4/17/90
Activity: Air Monitoring
Job Number: BAO-991
Work Order Number:

SAMPLED FOR:

	METHOD	CASSETTE	FILTER
☒ Asbestos:	☒ 7400 ☐ TEM	☒ 25mm ☐ 37mm	☒ MCE ☐ PC
☐ Airborne Dust:			
☐ Gas:			
☐ Vapor:			
☐ Other:			

Analytical Method: _____ Ambient Temp.: _____

Protection Worn During Sampling:

	Employee	IH
Full Body Coveralls	☐	☒
Respirator - Air Purifying	☐	☒
Respirator - Power Air Purifying	☐	☐
Respirator - Supplied Air	☐	☐

PERSONAL SAMPLING DATA

Employee Sampled: George Uzzle
Social Security Number: N/A
Smoker: ☒ Yes ☐ No
Job Function: Patch and Repair
Description of Activity: Technician

Signature of Employee: N/A

LAB ID	SAMPLE NO.	SAMPLE DATE	RESULTS FIBERS/CC	SAMPLE LOCATION
5924	MW-20	4/17/90	0.046	Sample taken inside work area along North east wall
5925	MW-21	4/17/90	<0.010	Sample taken outside work area at east end of Hallway
5926	MW-22	4/17/90	<0.005	Sample taken inside work area on west side of Boiler Room
5927	MW-23	4/17/90	0.009	Sample taken on East Side of Boiler Room.
5928	MW-24	4/17/90	TWO FIBERS PER 100 FIELDS	Field Blank
5929	MW-25	4/17/90	ONE FIBER PER 100 FIELDS	Lab Blank

FIELD SAMPLE NUMBER	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING START (LITERS/MIN.)	FLOW RATE SETTING STOP (LITERS/MIN.)	VOLUME LITERS	SAMPLE TYPE AMBIENT	SAMPLE TYPE AREA	SAMPLE TYPE FINAL	SAMPLE TYPE PERSONAL	SAMPLE LOCATION IN WORK AREA	SAMPLE LOCATION OUTSIDE WORK AREA	SAMPLE LOCATION N/A	INSTRUMENT SERIAL NUMBER
MW-20	9:35	11:15	100	3.2	3.2	320		X			X			MSA-1
MW-21	9:30	10:30	60	12.0	12.0	720		X			X			0988-A
MW-22	11:15	12:45	90	12.0	12.0	1080			X		X			BGI-11
MW-23	11:15	12:45	90	12.0	12.0	1080			X		X			BGI-13
MW-24						0			X				X	Field Blank
MW-25						0			X				X	Lab Blank

Comments: See Fig # for all sample locations. MARKED TOOL BOX AS SAMPLE 1.

Inspector: Kimatin Elbns
PRINT NAME
Kimatin Elbns
SIGNATURE
Date: 4/17/90

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

CHAIN OF CUSTODY FOR MICROSCOPY SERVICES

№ 0193

Submittal Date: 4/17/90 Submitted By: (Print) Kimathia Evans (Sign) [signature]

Client Name: Maryland of Md

Address:

Telephone: ( )

Results Required By: ASAP / /

Number of Samples: 6

Project Name: M. Washington E.S. 221

Address: 1804 Sulgrave Ave. Balto. Md. 21209

Contact Person: Kimathia Evans

Before Noon? ☐ Yes ☐ No

Type of Samples: ☒ Air ☐ Bulk ☐ Wipe ☐ Other:

Release Criteria: ☐ AHERA ☒ 0.010 f/cc ☐ % Asbestos ☐ Other:

LAB ID	SAMPLE NUMBER	DATE	VOLUME (Liters)	METHOD (Check) PCM	PLM	TEM	SEM	OTHER
5924	MW-20	4/17/90	320	X				Void
5925	MW-21	↓	720	X				OWA
5926	MW-22		1080	X				Final
5927	MW-23		1080	X				↓
5928	MW-24		0	X				
5929	MW-25	↓	0	X				

Relinquished By: (Signature)	Date	Relinquished By: (Signature)	Date
[signature]	4/17/90		
Name: (Printed) Kimathia Evans	Time 1215	Name: (Printed)	Time
Received By: (Signature) [signature]	Date 4-17-90	Received By: (Signature)	Date
Name: (Printed) R. Kimmett	Time 1250	Name: (Printed)	Time

LABORATORY STAFF ONLY: (CUSTODY)

1. Date/Time Received 4,17,90 @ 1250 by (Print) R. Kimmett Sign [signature]
2. Date/Time Analyzed 4,17,90 @ 1335 by (Print) R. Kimmett Sign [signature]
3. Date/Time Reported 4,17,90 @ 1400 by (Print) R. Kimmett Sign [signature]
4. Results Reported To K. Evans by (Print) R. Kimmett Sign [signature]

AHERA ACTIONS I.H. INFORMATION

Name of person collecting air sample: Marcon

Signature:

Date: 4-17-90

Location: Mount Washington ES # 221

Name and address of analyzing lab:

I H Services, Inc., 1521 Edgewood Street, Baltimore, Md.,21224

Date of Analysis: 4-25-90

Method: NIOSH 7400

Results: See Data Sheet

Name of Analysis: L. Boykin

Signature:

Statement that Lab. meets applicable requirements:

IH Services meets the applicable requirementrs of 40 CFR Part 763 Section 763.90 (i)-(2) (ii). The American Idustrial Hygiene Association Proficiency Analytical Testing Laboratory number is 21224-002. All other laboratories used by IH Services, Inc., for the analysis of samples also meet the applicable requirements of 40 CFR Part 763 Section 763.90 (i) (2) (ii)

AMA Analytical Services, Inc.

An AIHA Accredited Laboratory

4475 Forbes Blvd. • Lanham, MD 20706
(301) 459-2640 • 1-800-346-0961

(Please refer to this Number for Inquiries) Nº 08418

CHAIN OF CUSTODY FOR MICROSCOPY SERVICES

SUBMITTAL DATA

1. Submittal Date 4/24/90
2. Client Name MARCOR of Maryland, Inc.
3. Street/RFD/Box 24e Cockeysville Rd.
4. City Hunt Valley
5. Contact Person Ed Ellick
6. Specify Date Results Required: 4/27/90 Before Noon? Yes ☐ No ☒

Submitted by: E.S. Ellick (Print) E.S. Ellick (Signature)
Purchase Order # 03795 JOB # _____
Department/Division Maryland
State Maryland ZIP Code 21030
Telephone (301) 785 - 2525

* 2 sample #'s were MW on sheet and NW on sample 4/24 14:20

* Spoke w/ Heather on 4/25/90 at 15:00, she said the damage number was to be NW-1 Christine Kiser

SAMPLE DATA

1. Total Number of Samples 4
2. OPTICAL MICROSCOPY SAMPLES:
   a. Number of Samples 4
   b. Phase-Contrast _____ Polarized-light _____
   c. Number by Sample Type: AIRS 4 BLANKS _____ BULKS _____ WIPES _____ OTHER _____
3. ELECTRON MICROSCOPY SAMPLES:
   a. Number of Samples _____ b. Transmission _____ Scanning _____
   c. Number by Sample Type: AIRS _____ BLANKS _____ BULKS _____ WIPES _____ OTHER _____
   d. FILTER TYPE: PC ☐ MCE ☐ e. Porosity: _____ micron f. Diameter: 37 mm ☐ 25mm ☐
4. Released Criteria/Analytical Sensitivity: 0.010 f/cc ☐ 0.005 f/cc ☐ AHERA ☐ %ASBESTOS ☐ OTHER ☐
5. Field Sheet Attached?: Yes _____ No _____ **(AMA PERSONNEL REQUIRED)**

If no please complete the following:

SAMPLE No.	SAMPLE LOCATION	VOLUME (LITERS)	MICROSCOPY (Check) TEM	SEM	PCM	PLM	TYPE AIR	BLANK	BULK	WIPE	OTHER

A90674S
thru
A90674B

REPORTING DATA

1. Verbal Results to Whom? Name Ed Ellick Phone # (301) 785 - 2525
2. Written Results to Client? Yes ☒ No ☐ If no then name _____
3. Date Required 4/27/90 address _____
   city _____ state _____ zip _____

LABORATORY STAFF ONLY: (CUSTODY)

1. Date/Time RCVD. 4/24/90 @ 14:20 Comments: Courier by (Print) Carla Sabatino Sign Carla Sabatino
2. Date/Time Analyzed 4/25/90 @ 12:10 Comments: _____ by (Print) L. BOYKIN Sign L. Boykin
3. Date/Time Reported 4/25/90 @ 12:15 Comments: _____ by (Print) _____ Sign _____
4. Results Reported to faxed to Ed Ellick Comments: _____

WHITE - FINAL CUSTODY (SUBMIT) CANARY - LAB FINAL (SUBMIT) PINK - TRACKING (SUBMIT) GOLD - ORIGINATOR (RETAIN)

AMA Analytical Services, Inc.

An AIHA Accredited Laboratory

CERTIFICATE OF ANALYSIS

Marcor of Maryland, Inc.
P.O. Box 1043
246 Cockeysville Road
Hunt Valley, MD 21030
ATTENTION: Mr. Ellick

JOB SITE: Not provided
JOB NUMBER: N/P
SUBMITTED BY: Marcor of Maryland, Inc.

DATE ANALYZED: 04/25/90
CHAIN OF CUSTODY #: 8418
PERSON SUBMITTING: E. S. Ellick

Blank samples were not submitted.

PHASE CONTRAST MICROSCOPY

DATE SAMPLED	AMA LAB NUMBER	CLIENT NUMBER	VOLUME SAMPLED (LITERS)	FIBERS PER MILLIMETER SQUARED	FIBERS PER CUBIC CENTIMETER		SAMPLE TYPE AND LOCATION
04/16/90	9006745	MW-1	514L	******	VOIDED		VOID: Sample overloaded, unable to analyze.
04/17/90	9006746	MW-2	388L	106.3	0.107		Mount Washington Elementary #221: Personal, Inside Work Area, Boiler Room and Office area. George Uzzle 214-50-0068
04/18/90	9006747	EC 001	436L	0.0	<0.011	*	Edgecombe Circle Elementary #62: Personal, Inside Work Area, 1st floor rooms. Elmer Johnson Jr. 213-62-8915
04/19/90	9006748	EC 002	538L	0.0	<0.010	*	Edgecombe Circle Elementary #62: Personal, Inside Work Area, 1st floor rooms. Elmer Johnson Jr. 213-62-8915

AMA Analytical Services, Inc.

An AIHA Accredited Laboratory

CERTIFICATE OF ANALYSIS

Marcor of Maryland, Inc.
P.O. Box 1043
246 Corkeysville Road
Hunt Valley, MD 21030
ATTENTION: Mr. Ellick

JOB SITE: Not provided
JOB NUMBER: N/P
SUBMITTED BY: Marcor of Maryland, Inc.

ANALYSIS DATE: 04/25/90
CHAIN OF CUSTODY #: 8418
PERSON SUBMITTING: E. S. Ellick

Blank samples were not submitted.

PHASE CONTRAST MICROSCOPY

DATE SAMPLED	AMA LAB NUMBER	CLIENT NUMBER	VOLUME SAMPLED (LITERS)	FIBERS PER MILLIMETER SQUARED	FIBERS PER CUBIC CENTIMETER	SAMPLE TYPE AND LOCATION

* - THE LIMIT OF QUANTITATIVE DETECTION FOR AMA LABORATORIES
METHOD OF ANALYSIS: Fiber counts were determined by methods described in NIOSH Analytical Method 7400, 'Fibers'. All personnel samples were analyzed following OSHA Reference Method.

Lisa A. Boykin
Lisa Boykin

dtd 04/22/87

MARCOR

AIR MONITORING DATA SHEET

PROJECT: Mount Washington Elem. # 221 JOB NO.: BA0991

ADDRESS: 1804 Sulgrave Ave DATE: 4-16-90

ACTIVITY: Patch and Repair NEG. AIR: N/A In.H_2O

SAMPLED FOR: (✓) Asbestos (✓) Airborne Dust ( ) P&CAM 239 (✓) 7400
( ) Gas ( ) Vapor ( ) Other _____

PERSONAL PROTECTION WORN DURING SAMPLING:

(✓) Full Body Coveralls Respirator Type: (✓) A ( ) B ( ) C ( ) AABA

PERSONAL SAMPLING DATA: Employee Sampled: Scott Hartman

Job Function: Tech. Smoker: (✓) Yes ( ) No S.S. No.: 214-90-5147

Describe Activity: Patch and Repair Time IWA 257mins. Time OWA

Employee Signature: [signature] DATE: 4/16/90

Instrument Serial No.	Calibrated Flow (Liters/Min.) Start	Stop	Sample Number	Test Period Start	Stop	Check Sample Type PRELIM	INTERIM	FINAL	AREA	PERSONAL	Sample Location
AMK-16	2.0	2.0	MW-1	09:15	11:25					/	(✓)IWA ( ) OWA Boiler Room
AMK-16	2.0	2.0	MW-1	12:10	14:17					/	(✓)IWA ( ) OWA Boiler Room
											( )IWA ( ) OWA
											( )IWA ( ) OWA

PERSONAL SAMPLING DATA: Employee Sampled: _____

Job Function: _____ Smoker: ( ) Yes ( ) No S.S. No.: _____

Describe Activity: _____ Time IWA _____ Time OWA _____

Employee Signature: _____ DATE: _____

											( )IWA ( ) OWA
											( )IWA ( ) OWA
											( )IWA ( ) OWA
											( )IWA ( ) OWA

Monitoring Performed By: Elmer Johnson Signature: Elmer Johnson Date: 4-16-90

Supercedes 2.1.2.8.2. dtd 04/03/87

2.1.2.8.2
dtd 04/22/87

MARCOR
AIR MONITORING DATA SHEET

PROJECT: Mount Washington Elem. #221 JOB NO.: BA0991
ADDRESS: 1804 Sulgrave Ave. DATE: 4-17-90
ACTIVITY: Patch and Repair NEG. AIR: N/A In. H_2O

SAMPLED FOR: (✓) Asbestos (✓) Airborne Dust ( ) P&CAM 239 (✓) 7400
( ) Gas ( ) Vapor ( ) Other

PERSONAL PROTECTION WORN DURING SAMPLING:
(✓) Full Body Coveralls Respirator Type: (✓) A ( ) B ( ) C ( ) AABA

PERSONAL SAMPLING DATA: Employee Sampled: George Uzzle
Job Function: Tech Smoker: (✓) Yes ( ) No S.S. No.: 214-50-0068
Describe Activity: Patch and Repair Time IWA 194 mins Time OWA
Employee Signature: George Uzzle DATE: 4-17-90

Instrument Serial No.	Calibrated Flow (Liters/Min.) Start	Stop	Sample Number	Test Period Start	Stop	Check Sample Type PRELIN	INTERIM	FINAL	AREA	PERSONA	Sample Location
AMK-16	2.0	2.0	MW-2	07:40	09:45					/	(✓)IWA ( ) OWA Boiler Room and office area
AMK-16	2.0	2.0	MW-2	10:03	11:12					/	(✓)IWA ( ) OWA Boiler Room and office area
											( )IWA ( ) OWA
											( )IWA ( ) OWA

PERSONAL SAMPLING DATA: Employee Sampled:
Job Function: Smoker: ( ) Yes ( ) No S.S. No.:
Describe Activity: Time IWA Time OWA
Employee Signature: DATE:

											( )IWA ( ) OWA
											( )IWA ( ) OWA
											( )IWA ( ) OWA
											( )IWA ( ) OWA

Monitoring Performed By: Elmer Johnson Signature: Elmer Johnson Date: 4-17-90

Supercedes 2.1.2.8.2. dtd 04/03/87

STATE OF MARYLAND-DEPARTMENT OF HEALTH AND MENTAL HYGIENE
OFFICE OF ENVIRONMENTAL PROGRAMS
AIR MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY
BALTIMORE, MARYLAND 21224

NOTICE OF ASBESTOS PROJECT

BA0-991

1. NAME OF LICENSEE PERFORMING WORK	LICENSE NUMBER	DATE OF NOTICE
MARCOR OF MARYLAND	21-03-005	April 12, 1990

2. LICENSEE CONTACT NAME	TELEPHONE NUMBER
CHRIS E. CHRISTIAN	(301) 785-2525

3. SITE OWNER NAME	OWNER ADDRESS
CITY OF BALTIMORE	2011 LINDEN AVE. BALTIMORE, MD 21217

4. SITE NAME	SITE ADDRESS (STREET,CITY,ZIP)
Mt. Washington Elementary School #221	1801 Sulgrave Avenue Baltimore, Maryland 21209

5. BUILDING DESCRIPTION (SIZE, AGE, PRIOR USE, ETC.)

A two story, brick structure, built in 1955, and is currently used as a school.

6. AREA OF REMOVAL (LOCATION: AMOUNT OF FRIABLE ASBESTOS MATERIAL IN LINEAR OR SQUARE FEET)

Boiler Room: Patch and repair approx. 291 SQ FT of boiler insulation and approx. 116 LN FT of ACM pipe insulation. Patch and repair approx. 287 LN FT of ACM pipe insulation throughtout the entire school.

6a. START DATE	FINISH DATE	ASBESTOS PROJECT: #1 FOR YR. #2 FOR YRS.
April 13, 1990	April 20, 1990	NESHAP YES

7. REMOVAL PROCEDURES (TO COMPLY WITH EPA,OSHA,COMAR AND ALL LOCAL REGULATIONS)

- Use of 6 mil poly sheeting where required.
- Use of HEPA equipped vacuums and negative air machines.
- Use of full body disposable, protective coveralls.
- Use of respiratory protection as required.
- Use of encapsulant as final stage of cleaning process.

LABORATORY ASSISTANCE BY: I. H. SERVICES, INC.

7a. WORK SCHEDULE (PLEASE SPECIFY IF WEEKEND ONLY, NIGHT SHIFT, ETC.)

7:00 a.m. to 3:30 p.m. Daily

7b. DEMOLITION PROJECT RENOVATION PROJECT (ENCAPSULATION PROJECT)

(CIRCLE ONE)

8. DISPOSAL SITE NAME
Prichard Landfill
DISPOSAL SITE ADDRESS
5835 Big Sandy Run Road; Prichard, WV 25550

9. IF THIS IS AN EMERGENCY DEMOLITION OR RENOVATION, GIVE NAME, TITLE, AUTHORITY OF THE STATE OR LOCAL GOVERNMENT REPRESENTATIVE WHO HAS ORDERED THE WORK.

10. EMPLOYEE INFORMATION:

ON A SEPARATE PAGE, PROVIDE THE FOLLOWING INFORMATION FOR EACH EMPLOYEE NOT LISTED ON SCHEDULE 1 OF "APPLICATION FOR LICENSE TO REMOVE/ENCAPSULATE ASBESTOS" (DHMH 258) THAT WILL HANDLE ASBESTOS ON THIS PROJECT.

A. FULL NAME
B. SOCIAL SECURITY NUMBER
C. NAME OF ORGANIZATION THAT PROVIDED APPROVED TRAINING COURSE
D. DATE OF MOST RECENT APPROVED TRAINING COURSE ATTENDED

11. GENERAL INSTRUCTION

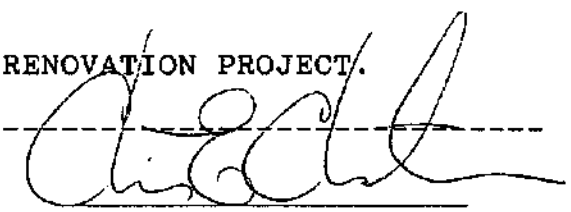
THIS NOTICE MUST BE RECEIVED BY THE DEPARTMENT:

A. AT LEAST 20 DAYS PRIOR TO START OF DEMOLITION PROJECT IF LESS THAN 260 LINEAR FEET OR 160 SQUARE FEET OF FRIABLE ASBESTOS MATERIALS ARE INVOLVED.

B. AT LEAST 10 DAYS PRIOR TO START OF DEMOLITION PROJECT IF MORE THAN 260 LINEAR FEET OR 160 SQUARE FEET OF FRIABLE ASBESTOS MATERIALS ARE INVOLVED.

C. AT LEAST 3 DAYS PRIOR TO START OF EACH OF ITS FIRST 2 PLANNED ASBESTOS PROJECTS PER COMAR 10.18.23.09B (CHECK APPROPRIATE BOX ON LINE 6a.)

D. AS SOON AS POSSIBLE PRIOR TO START OF RENOVATION PROJECT.



Signature of Chief Executive Officer or Designee
Chris E. Christian

Name
President

Title

cc: Asbestos Coordinator
Region 3
841 Chestnut Building
Philadelphia, PA 19106

INSTRUCTIONS ON ATTACHED AND INCLUDED

TRAINING RECORDS

1. Copies of all training certificates are in the file at the office of the asbestos coordinator. All people on these lists were trained by Aerosol Monitoring and Analysis, Inc. of Hanover, Maryland (1-800-221-1745) (usually referred to AMA).

2. The included and attached lists are personnel of Marcor, Inc. only as they are the primary supplier of services since 1987 thru 1991 of asbestos abatement services.

3. The last list of 17 pages are AHERA trained workers or supervisors that have left Marcor employ. The date of certification is the initial date of training as AHERA workers. The expiration date would be one year after the date of certification. The social security number is used in lieu of the control number to individually track these people since they have left Marcors Employ.

JANUARY, 1990

NAME	DATE	CERT.#	HOURS	EXP. DATE
SHAUN DETER	1/04/90	90-0039	08	1/91
CHA PHIMPHANH	1/04/90	90-0040	08	1/91
C. THONGDYGNGLAT	1/04/90	90-0046	08	1/91

FEBRUARY, 1990

NAME	DATE	CERT.#	HOURS	EXP. DATE
HUMPHREY YOMEL SONGURO	2/02/90	90-0420	08	3/91
EDWIN MERRITT	2/20/90	90-0490	32	2/91
MARK STEIN	2/09/90	90-0448	08	2/91
AMED NIAZ HAZEL	2/01/90	90-0363	24	2/91
KENNETH SCHROEDER	2/24/90	90-0493	24	2/91
ZACHARY WASHINGTON	2/27/90	90-0533	08	2/91

MARCH, 1990

NAME	DATE	CERT.#	HOURS	EXP. DATE
SCOTT HARTMAN	3/27/90	90-0749	08	3/91
FRANK ZAMBELLI	3/13/90	90-0643	08	3/91
YOMI HUMPHREY SOGURO	3/13/90	90-0629	08	3/91
RONALD HARVEY	3/13/90	90-0636	08	3/91
MARK STEIN	3/13/90	90-0644	08	3/91
LARRY WILLIAMS	3/13/90	90-0633	08	3/91
ROBERT GILL	3/29/90	90-0731	24	3/91
JIM KELBAUGH	3/13/90	90-0631	08	3/91
KHAI KEOHANAM	3/13/90	90-0635	08	3/91
PHATH KEOHANAM	3/13.90	90-0634	08	3/91
RICHARD KRIVOSH	3/27/90	90-0745	08	3/91
PAIRUCH SINGPARU	3/27/90	90-0743	08	3/91
ROBERT SPARKS	3/13/90	90-0630	08	3/91
VANKHAM VONGSALY	3/13/90	90-0640	08	3/91
WILLIAM WALRATH	3/01/90	90-0527	24	3/91

APRIL, 1990

NAME	DATE	CERT.#	HOURS	EXP. DATE
ROBERT FRANKLIN	4/19/90	90-0891	24	4/91
DAVID HILTON	4/19/90	90-0869	24	4/91

MAY, 1990

NAME	DATE	CERT.#	HOURS	EXP. DATE
LOU LUCAS	5/08/90	90-1002	08	5/91
RICHARD BENNETT	5/08/90	90-1003	08	5/91
RICK EIKENBERG	5/08/90	90-0999	08	5/91
CHRIS CHRISTIAN	5/08/90	90-1001	08	5/91
JACK MCCARGISH	5/22/90	90-1109	08	5/91
CHARLES PAMPLIN	5/08/90	90-0998	08	5/91
LINDA SCHROEDER	5/03/90	90-0956	24	5/91
EDWARD WLADKOWSKI	5/31/90	90-1210	24	5/91

JUNE, 1990

NAME	DATE	CERT.#	HOURS	EXP. DATE
CHARLES ARMSTRONG	6/26/90	90-1490	24	6/91
RUFUS CARWELL	6/20/90	90-1427	08	6/91
HARRY GOODE, SR.	6/12/90	90-1343	08	6/91
BOUNTHAY HOMSOMBATH	6/12/90	90-1360	08	6/91
VILAY HOMSOMBATH	6/12/90	90-1361	08	6/91
BOBBY JACKSON	6/12/90	90-1354	08	6/91
STEVE LOMBARDI	6/28/90	90-1491	24	6/91
WAYNE OLSON	6/21/90	90-1395	24	6/91
AMPHONE PHIMPHANH	6/26/90	90-1484	08	6/91
MICHAEL RUDENSKY	6/12/90	90-1352	08	6/91
ROLAND SUMMERS	6/12/90	90-1342	08	6/91

JULY, 1990

NAME	DATE	CERT.#	HOURS	EXP. DATE
FREDERICK SCOTT	7/31/90	90-1940-R-S	08	7/91
DANIEL BOND	7/17/90	90-1753-W	24	7/91
KEVIN FOLKENRATH	7/26/90	90-1859-W	24	7/91
BILL GOOD	7/12/90	90-1645-W	24	7/91
FEMI JINADU	7/05/90	90-1605-R-W	08	7/91
PAUL JONES	7/05/90	90-1617-R-W	08	7/91
ADAM KENDALL	7/19/90	90-1768-W	24	7/91
ALAN KLOCK	7/26/90	90-1863-W	24	7/91
WILLIAM NEILL	7/19/90	90-1942-W	24	7/91
SOMPHONE PATHOUMTHONG	7/17/90	90-1821-R-W	08	7/91

JULY, 1990

NAME	DATE	CERT.#	HOURS	EXP. DATE
PHET PHOUKIEO	7/26/90	90-1866-W	24	7/91
DUANE RAINEY	7/17/90	90-1818-R-W	08	7/91
YANG SONG	7/17/90	90-1820-R-W	08	7/91
JOHN TERRY	7/19/90	90-1767-W	24	7/91
DONALD WOLFE	7/05/90	90-1618-R-W	08	7/91
CHARLES RAINEY	7/17/90	90-1819-R-W	08	7/91

AUGUST, 1990

NAME	DATE	CERT.#	HOURS	EXP. DATE
JOYCE BEAL	8/28/90	90-2250-R-W	08	8/91
KEVIN BERG	8/14/90	90-2041-W	24	8/91
CHERI COFFEY	8/14/90	90-2060-R-W	08	8/91
TYRON GILES	8/02/90	90-1951-W	24	8/91
KENNETH HOWARD	8/23/90	90-2149-W	24	8/91
EVERETT HUTCHINS	8/02/90	90-1965-W	24	8/91
DONNIE JACKSON	8/28/90	90-2262-R-W	08	8/91
GEORGE LAZZARO	8/09/90	90-2012-W	24	8/91
KHAMOUNE MANIPHONE	8/14/90	90-2063-R-W	08	8/91
RICHARD MANGUM	8/02/90	90-1972-W	24	8/91
BERNARD MILLER	8/02/90	90-1968-W	24	8/91
KEITH MORRIS	8/14/90	90-2057-R-W	08	8/91
MICHAEL NELSON	8/17/90	90-2044-S	32	8/91
SOMPHONE SIRISOVK	8/14/90	90-2072-R-W	08	8/91
BOUALAY THEPSOUVANH	8/02/90	90-1961-W	24	8/91
SOMBOUN THEPSOUVANH	8/02/90	90-1952-W	24	8/91
RONALD TOLBERT	8/02/90	90-1969-W	24	8/91
GEORGE UZZLE	8/14/90	90-2081-R-W	08	8/91
NATHANIEL WITHERSPOON	8/14/90	90-2068-R-W	08	8/91

SEPTEMBER, 1990

NAME	DATE	CERT.#	HOURS	EXP. DATE
ROBERT GILL	9/21/90	90-2388-S	32	9/91
KENNETH HOWARD	9/14/90	90-2342-V	08	9/91
JOHN MESSLER	9/20/90	90-2387-W	24	9/91

MARCOR OF MARYLAND, INC.
AHERA TRAINED PERSONNEL

JANUARY, 1989

NAME	DATE	CERT.#	HOURS	EXP. DATE
C. THONGDYGENELET	1/30/89	89-0268	08	1/90
CHA PHINPHOMU	1/30/89	89-0263	08	1/90
KHAMLA KHANTRY	1/06/89	89-0117	08	1/90
ROBIN BALONIS	1/13/89	89-0127	08	1/90
CHOI	1/30/89	89-0269	08	1/90

FEBRUARY, 1989

NAME	DATE	CERT.#	HOURS	EXP. DATE
RICK EIKENBERG	2/07/89	89-0303	24	2/90

MARCH,1989

NAME	DATE	CERT.#	HOURS	EXP. DATE
RICHARD BENNETT	3/29/90	89/0670	08	3/90

MAY, 1989

NAME	DATE	CERT.#	HOURS	EXP. DATE
CHRIS CHRISTIAN	5/5/89	89-1860	32	5/90

JUNE, 1989

NAME	DATE	CERT.#	HOURS	EXP. DATE
AMPHON PHIMPHANH	6/29/89	89-2605	24	6/90

JULY, 1989

NAME	DATE	CERT.#	HOURS	EXP. DATE
MICHAEL MOTE	7/29/89	89-3709	08	7/90
FEMI JINADU	7/07/89	89-2706	24	7/90
PAUL JONES	7/13/89	89-3582	24	7/90
DONALD WOLFE	7/12/89	6855-ST	24	7/90

OCTOBER, 1989

NAME	DATE	CERT.#	HOURS	EXP. DATE
RENZO CRUZ	10/26/89	89-10-26-01	32	10/90

MARCOR OF MARYLAND, INC.
AHERA TRAINED PERSONNEL

JANUARY, 1988

NAME	DATE	CERT.#	HOURS	EXP. DATE
GARDNER PARKS	1/19/88	88-063	24	1/89
KHAMLA KHANTRY	1/19/88	88-059	24	1/89
PATH KEOHANAN	1/21/88	88-032	24	1/89
B. H. SOUVANNAVONG	1/14/88	88-038	24	1/89

FEBRUARY, 1988

NAME	DATE	CERT.#	HOURS	EXP. DATE
CHOI	2/18/88	88-061	24	2/89
CHA PHIMPHANH	2/18/88	88-207	24	2/89
C. THONGDYGENELET	2/18/88	88-202	24	2/89

MARCH, 1988

NAME	DATE	CERT.#	HOURS	EXP. DATE
FRANK ZAMBELLI	3/15/88	88-271	32	3/89

APRIL, 1988

NAME	DATE	CERT.#	HOURS	EXP. DATE
LOU LUCAS	4/12/88	88-650	32	4/89
RICHARD BENNETT	4/09/88	88-04-10-02E	24	4/89
HUMPHREY YOMEL	4/09/88	88004-10-01E	24	4/89
LARRY WILLIAMS	4/09/88	88-04-10-17E	32	4/89
RICHARD KRIVOSH	4/16/88	88-04-10-05E	24	4/89

JUNE, 1988

NAME	DATE	CERT.#	HOURS	EXP. DATE
GARDNER PARKS	6/10/88	88-778	08	6/89

JULY, 1988

NAME	DATE	CERT.#	HOURS	EXP. DATE
FRED SCOTT	7/22/88	88-952	32	7/89
SOMPHONE PATHOUMTHONE	7/17/88	88-960	24	7/89
YANG SONG	7/17/88	88-956	24	7/89

AUGUST, 1988

NAME	DATE	CERT.#	HOURS	EXP. DATE
MICHAEL MOTE	8/13/88	88-1018	24	8/89
SYSALEUMSACK VONGSHSKDY	8/08/88	88-08-08-07E	32	8/89
MANIPHONE KHAMOUNE	8/14/88	88-1020	24	8/89
CHARLES RAINEY	8/14/88	88-1033	24	8/89
DUANE RAINEY	8/14/88	88-1034	24	8/89
SOMPHONE SIRISOUK	8/14/88	88-1015	24	8/89

DECEMBER, 1988

NAME	DATE	CERT.#	HOURS	EXP. DATE
ROBIN BALONIS	12/21/88	88-1783	08	12/89
KHAMLA KHANTRY	12/21/88	88-1785	08	12/89
S. VONGPHAKDY	12/21/88	88-1786	08	12/89
PHATH KEOHANAM	12/21/88	88-1789	08	12/89
B. H. SOUVANNAVONG	12/21/88	88-1781	08	12/89

AMENDMENT NO. 3

DATED SEPTEMBER 27, 1991

TO

ASBESTOS-CONTAINING

MATERIALS MANAGEMENT

PLAN

DATED MAY 9, 1989

FOR

SCHOOL NO. 221

SCHOOL NAME: MT. WASHINGTON ELEMENTARY

NOTE: NO ASBESTOS RESPONSE ACTIONS

FOR SCHOOL FOR PERIOD

REPORTED UNDER THIS

AMENDMENT

ISSUED BY THE

BALTIMORE CITY PUBLIC SCHOOLS

ASBESTOS COORDINATOR AND

DESIGNATED LOCAL EDUCATION

AGENCY REPRESENTATIVE

ASBESTOS UPDATING

AMENDMENT #3

INTRODUCTION

These amendments are issued annually to update the asbestos management plan for each building under control of the Baltimore City Public Schools.

Contents of each annual amendment will include asbestos response actions for the building if any, a table 1A containing the remaining quantities of asbestos containing material in the building if there was an asbestos response action at the building that removed asbestos, a copy of the surveillance logs for the building done at a minimum of a semi-annual basis and any other pertinent information. An asbestos response action shall include any work to clean up asbestos in response to a major or minor fiber release episode, or any work action to remove, encapsulate, enclose or repair asbestos containing materials.

Persons reading this amendment are encouraged to read the asbestos management plan to thoroughly understand the location and extent of asbestos containing materials in the building.

PLEASE POST PLEASE POST

BALTIMORE CITY PUBLIC SCHOOLS

ASBESTOS PROGRAM

NOTICE TO SCHOOL BUILDING VISITORS AND OCCUPANTS (TEACHERS, STUDENTS, OPERATING ENGINEERS AND CUSTODIAL PERSONS) OF ASBESTOS MANAGEMENT PLAN AMENDMENT NUMBER 3 AND AVAILABILITY OF ASBESTOS MANAGEMENT PLANS FOR INSPECTION.

An amendment to the school Asbestos Management Plan has been appended to the management plans for asbestos to be kept in the building administrative office. This is amendment number three (3) and is dated September 27, 1991. This amendment is available for inspection by making request to the building principal.

EPA Rules for school buildings required:

(1) We maintain records on asbestos in each school,

(2) Inform our building occupants and visitors on asbestos in each school building of locations of and response actions for asbestos in each school,

(3) Give right-of-entry to EPA and State of Maryland Environmental Inspectors.

Failure to fulfill the above may result in serious civil and possible criminal penalties assessed against the City for failing to perform the above including possible criminal penalties against persons who willfully avoid the EPA Rules.

If the Asbestos Management Plan and the Amendments to it are not available in your school from your principal report it to Director of Facilities on 396-8665 immediately.

August 1990 TO August 1991

ASBESTOS MANAGEMENT PROGRAM

FIELD INSPECTION LOG OF QUARTERLY SURVEILANCE

FOR SCHOOL P.S. 221

1ST QUARTER INSPECTION

Performed by Roland M. Diggs

Date Performed 11/7/90

2ND QUARTER INSPECTION

Performed by Roland M. Diggs

Date Performed 4/10/91

3RD QUARTER INSPECTION

Performed by 7/3/91 Roland M. Diggs

Date Performed 7/3/91

4TH QUARTER INSPECTION

Performed by _____

Date Performed _____

SEE ATTACHED SURVEILANCE REPORT FORMS FOR FINDINGS

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 11/7/90 SURVEYOR: Roland M. Diggs

SCHOOL NO: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
01- Boiler Room	Boiler breeching block and trowelled-on insulation		✓		✓		✓			
	Hot water generator block and trowelled-on insulation		✓		✓		✓			PARM & Repair - DONE
	Heating system preformed pipe insulation		✓		✓		✓			
	Heating system fitting and valve trowelled-on insulation		✓		✓		✓			
	Domestic water fitting and valve trowelled-on insulation		✓		✓		✓			" " "
	Fire door		✓		✓		✓			" " "

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 11/7/90 SURVEYOR: Roland M. Diggs

SCHOOL NO: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
02- Crawl Space	Heating system preformed pipe insulation		✓		✓		✓			
	Heating system fitting trowelled-on insulation		✓		✓		✓			
	Domestic water fitting trowelled-on insulation		✓		✓		✓			PATCH & REPAIR DONE
03- Above Suspended Ceilings and in Pipe Chases	Heating system preformed pipe insulation		✓		✓		✓			

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 11/7/90 SURVEYOR: Roland M. Diggs

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
06- Hallways and Stairwells	Heating system preformed pipe insulation		✓		✓		✓			PATCH & REPAIR DONE -
	Heating system fitting trowelled-on insulation		✓		✓		✓			
	Vinyl asbestos tile		✓		✓		✓			
07- Storage Areas	Heating system preformed pipe insulation		✓		✓		✓			
	Heating system fitting trowelled-on insulation		✓		✓		✓			
	Domestic water fitting trowelled-on insulation		✓		✓		✓			

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 11/7/90 SURVEYOR: Roland M. Diggs

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Heating system fitting trowelled-on insulation		✓		✓		✓			
	Domestic water fitting trowelled-on insulation		✓		✓		✓			
04- Cafeteria	Vinyl asbestos tile		✓		✓		✓			
	Fire doors (2)		✓		✓		✓			
05- Incinerator Room	Domestic water fitting trowelled-on insulation		✓		✓		✓			PATCHES Repair - DONE -
	Fire door		✓		✓		✓			

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 11/7/90 SURVEYOR: Roland M. Diggs

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
08- Classrooms	Heating system preformed pipe insulation		✓		✓		✓			patch & repair done
	Heating system fitting trowelled-on insulation		✓		✓		✓			
	Vinyl asbestos tile		✓		✓		✓			
09- Multi-Purpose Room and Stage	Heating system preformed pipe insulation		✓		✓		✓			
	Heating system fitting trowelled-on insulation		✓		✓		✓			

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 11/7/90

SCHOOL NO.: PS221

SURVEYOR: Roland M. Diggs

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation		✓		✓		✓			
	Vinyl asbestos tile		✓		✓		✓			
	Fire doors (2)		✓		✓		✓			
10- Toilets	Heating system preformed pipe insulation		✓		✓		✓			Patch & Repair - DONE
	Heating system fitting trowelled-on insulation		✓		✓		✓			
	Domestic water fitting trowelled-on insulation		✓		✓		✓			

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 11/7/90 SURVEYOR: Roland M. Diggs

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation		✓		✓		✓			
11- Janitor's Closet	Domestic water fitting trowelled-on insulation		✓		✓		✓			PATCH/REPAIR DONE
12- Offices, Health Suite, and Lounge	Heating system preformed pipe insulation		✓		✓		✓			
	Heating system fitting trowelled-on insulation		✓		✓		✓			
	Domestic water fitting trowelled-on insulation		✓		✓		✓			

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 11/7/90 SURVEYOR: Roland M. Diggs

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Vinyl asbestos tile		✓		✓		✓			
13- Library	Vinyl asbestos tile		✓		✓		✓			

TABLE 1-A
ACM QUANTITIES BY APPLICATION

FOR PS 221

ACM APPLICATION	QUANTITY SQUARE FEET	QUANTITY LINEAR FEET
CEILINGS & WALLS		
SPRAYED-ON		
TILE		
ACOUSTIC PLASTER		
OTHER PLASTER		
WALLBOARD		
FLOOR COVERINGS	30,000	
MECHANICAL		
PIPE		2,610
ELBOWS & FITTINGS	1,410	
BOILERS & BREECHING	400	
TANKS	100	
DUCTWORK		
OTHER (GASKETS, FLEXIBLE CONNECTORS, ETC)		
OTHER		
CURTAINS		
FIREDOORS	126	
CEMENT BOARD		

NOTE: FOR LOCATIONS OF ACBM APPLICATIONS, SEE THE PRECEDING TEXT IN THIS SECTION (1.2) AND APPENDIX H.

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
01- Boiler Room	Boiler breeching block and trowelled-on insulation									
	Hot water generator block and trowelled-on insulation									
	Heating system preformed pipe insulation									
	Heating system fitting and valve trowelled-on insulation									
	Domestic water fitting and valve trowelled-on insulation									
	Fire door									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
02- Crawl Space	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Domestic water fitting trowelled-on insulation									
03- Above Suspended Ceilings and in Pipe Chases	Heating system preformed pipe insulation									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
06- Hallways and Stairwells	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Vinyl asbestos tile									
07- Storage Areas	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Domestic water fitting trowelled-on insulation									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Heating system fitting trowelled-on insulation									
	Domestic water fitting trowelled-on insulation									
04- Cafeteria	Vinyl asbestos tile									
	Fire doors (2)									
05- Incinerator Room	Domestic water fitting trowelled-on insulation									
	Fire door									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
08- Classrooms	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Vinyl asbestos tile									
09- Multi-Purpose Room and Stage	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation									
	Vinyl asbestos tile									
	Fire doors (2)									
10- Toilets	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Domestic water fitting trowelled-on insulation									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation									
11- Janitor's Closet	Domestic water fitting trowelled-on insulation									
12- Offices, Health Suite, and Lounge	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Domestic water fitting trowelled-on insulation									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Vinyl asbestos tile									
13- Library	Vinyl asbestos tile									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____

SCHOOL NO: PS221

SURVEYOR: _____

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
02- Crawl Space	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Domestic water fitting trowelled-on insulation									
03- Above Suspended Ceilings and in Pipe Chases	Heating system preformed pipe insulation									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____

SCHOOL NO.: PS221

SURVEYOR: _____

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
06- Hallways and Stairwells	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Vinyl asbestos tile									
07- Storage Areas	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Domestic water fitting trowelled-on insulation									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____

SCHOOL NO.: PS221

SURVEYOR: _____

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Heating system fitting trowelled-on insulation									
	Domestic water fitting trowelled-on insulation									
04- Cafeteria	Vinyl asbestos tile									
	Fire doors (2)									
05- Incinerator Room	Domestic water fitting trowelled-on insulation									
	Fire door									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____

SCHOOL NO.: PS221

SURVEYOR: _____

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
08- Classrooms	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Vinyl asbestos tile									
09- Multi-Purpose Room and Stage	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____

SCHOOL NO.: PS221

SURVEYOR: _____

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation									
	Vinyl asbestos tile									
	Fire doors (2)									
10- Toilets	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Domestic water fitting trowelled-on insulation									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____

SCHOOL NO.: PS221

SURVEYOR: _____

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation									
11- Janitor's Closet	Domestic water fitting trowelled-on insulation									
12- Offices, Health Suite, and Lounge	Heating system preformed pipe insulation									
	Heating system fitting trowelled-on insulation									
	Domestic water fitting trowelled-on insulation									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____

SCHOOL NO.: PS221

SURVEYOR: _____

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Vinyl asbestos tile									
13- Library	Vinyl asbestos tile									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: _____ SURVEYOR: _____

SCHOOL NO: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
01- Boiler Room	Boiler breeching block and trowelled-on insulation									
	Hot water generator block and trowelled-on insulation									
	Heating system preformed pipe insulation									
	Heating system fitting and valve trowelled-on insulation									
	Domestic water fitting and valve trowelled-on insulation									
	Fire door									

AMENDMENT #6

December 1, 1994
(For the period ending June 30, 1994

AHERA

ASBESTOS CONTAINING MATERIALS MANAGEMENT PLAN

dated May 9, 1989

School No. PS221

School Name Mt Washington Elementary

NOTICE This amendment includes Asbestos Response Actions for school for period reported under this amendment attached.

Issued by
BALTIMORE CITY PUBLIC SCHOOLS

Asbestos Coordinator
Designated Local Education Agency Representative

City of Baltimore Public Schools
AMENDMENT #6
January 1, 1995

INTRODUCTION

These amendments are issued annually to update the **Asbestos Management Plan** for each building under control of Baltimore City Public Schools.

Contents of each annual amendments will include:

- Asbestos response actions for the building (if any):
- **Table 1A** containing the remaining quantities of asbestos containing material in the building:
- A copy of the surveillance logs for the building done at a minimum of a semi-annual basis;
- any other pertinent information.

An asbestos response action shall include any work to clean up asbestos in response to a major or minor fiber release episode, or any work action to remove, encapsulate, enclose or repair asbestos containing materials.

Persons reading this amendment are encouraged to read the ***Asbestos Management Plan*** to thoroughly understand the location and extent of asbestos containing materials in the building .

David W. Mitchell
Baltimore City Asbestos Coordinator
and Designated LEA Representative

PLEASE POST PLEASE POST

CITY OF BALTIMORE PUBLIC SCHOOLS
ASBESTOS PROGRAM

NOTICE TO SCHOOL BUILDING VISITORS AND OCCUPANTS (TEACHERS, STUDENTS, OPERATING ENGINEERS AND CUSTODIAL PERSONS) OF **ASBESTOS MANAGEMENT PLAN AMENDMENT NO. 6** AND AVAILABILITY OF **ASBESTOS MANAGEMENT PLAN** FOR INSPECTION.

An amendment to the **Asbestos Management Plan** has been appended to the management plans for asbestos to be kept in the building administrative office. This is Amendment #6 and is dated January 1, 1995. This amendment is available for inspection by making a request to the building principal.

EPA Rules for school buildings require:

(1) We maintain records on asbestos in each school.

(2) Inform our building occupants and visitors on asbestos in each school building of locations of and response actions for asbestos in each school.

(3) Give right-of -way to EPA and State of Maryland environmental inspectors.

Failure to fulfill the above may result in serious civil and possible criminal penalties assessed against the City for failure to perform the above including possible criminal penalties against persons who willfully avoid the EPA Rules.

If the **Asbestos Management Plan and the Amendments** to it are not available in your school from the principal report it to **Environmental Services - Asbestos Office at 396-7832 immediately.**

David W. Mitchell
Baltimore City Asbestos Coordinator
and Designated LEA Representative

TABLE 1-A

Removal for Fiscal 94 (July 93 to June 94)

Location: PS 221

Removals

	Beg Yr	Removal 94	End Yr	Units
Spray On				sf
Tile				sf
Acoustic Plaster				sf
Other Plaster				sf
Wallboard				sf
Pipe	2530		2530	lf
Elbows Fittings	1410		1410	sf
Boilers Breeching	400		400	sf
Tanks	100	100	0	sf
Ductwork				lf
Other TSI				lf
Curtains				sf
Firedoors	126		126	sf
Cement Board				sf
VAT	3000		3000	sf
Decon				sf
Soil				sf
Misc Debris CY				cy

Repairs

Patch LF	
Encapsulate LF	
Encapsulate SF	
Patch SF	
Carpet SF	
Wire LF	
MiscLF	
MiscSF	

RECEIPT OF 1 COPY OF AMENDMENT NUMBER 5 DATED DECEMBER 1, 1993 TO BALTIMORE CITY PUBLIC SCHOOLS ASBESTOS MANAGEMENT PLANS

DELIVERED BY: E. Burgess
(Print name)

Ernest Burgess
(Signature)

Date: 12/19/94
Time: 12:00

DELIVERED TO:

School No.: 221

School Name: Mt. Washington ECEP

School Address: 1801 Sulgrave Ave

RECEIVED BY: Jacqueline Waters-Scofield Phone No: 396-6354
(Print name)

Jacqueline Waters-Scofield
(Signature)

Date Received: 12/19/94 Time: 12:00 p.m.

VISUAL VERIFICATION OF MANAGEMENT PLANS ARE AT SCHOOL WITH AMENDMENTS NUMBERS 1, 2, 3, 4 & 5 BY PERSON DELIVERING PLAN:

YES: _____ NO: V

(Deliverer to verify and initial appropriate answer.)

Please return to:

Environmental Services
2011 Linden Avenue, Portable Bldg. #61
Baltimore, MD. 21217

PUBLIC BUILDING MANAGEMENT

ENVIRONMENTAL SERVICES

FIELD INSPECTION LOG FOR SEMI-ANNUAL SURVEILANCE

FOR P.S.# 231

1ST SEMI-ANNUAL INSPECTION

Performed by: E. Swiggs

Date Performed: 7/94

2ND SEMI-ANNUAL INSPECTION

Performed by: E. Swiggs

Date Performed: 12/94

SPECIAL NOTES FOR ANY MAJOR FINDINGS OR CHANGES IN BUILDINGS

AMENDMENT 2 AND 5 MISSING

SEE ATTACHED SURVEILANCE REPORT FORMS FOR FINDINGS

Please return to:

Environmental Services
2011 Linden Avenue, Portable Bldg. #61
Baltimore, MD. 21217

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

SURVEYOR: E. Jones

DATE: 7/94

SCHOOL NO: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
01- Boiler Room	Boiler breeching block and trowelled-on insulation						✓			
	Hot water generator block and trowelled-on insulation						✓			
	Heating system preformed pipe insulation						✓			
	Heating system fitting and valve trowelled-on insulation						✓			
	Domestic water fitting and valve trowelled-on insulation						✓			
	Fire door									

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 7/90

SURVEYOR: Burgess

SCHOOL NO: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
02- Crawl Space	Heating system preformed pipe insulation						✓			
	Heating system fitting trowelled-on insulation						✓			
	Domestic water fitting trowelled-on insulation						✓			
03- Above Suspended Ceilings and in Pipe Chases	Heating system preformed pipe insulation						✓			

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 7/94

SURVEYOR: Gaines

SCHOOL NO.: P522J

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Heating system fitting trowelled-on insulation						✓			
	Domestic water fitting trowelled-on insulation						✓			
04- Cafeteria	Vinyl asbestos tile						✓			
	Fire doors (2)						✓			
05- Incinerator Room	Domestic water fitting trowelled-on insulation						✓			
	Fire door						✓			

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 5/94

SURVEYOR: GBriggs

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
08- Classrooms	Heating system preformed pipe insulation						✓			
	Heating system fitting trowelled-on insulation						✓			
	Vinyl asbestos tile						✓			
09- Multi-Purpose Room and Stage	Heating system preformed pipe insulation						✓			
	Heating system fitting trowelled-on insulation						✓			

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 7/96

SURVEYOR: Swiggs

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation						✓			
	Vinyl asbestos tile						✓			
	Fire doors (2)						✓			
10- Toilets	Heating system preformed pipe insulation						✓			
	Heating system fitting trowelled-on insulation						✓			
	Domestic water fitting trowelled-on insulation						✓			

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 7/94

SURVEYOR: [illegible]

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation						✓			
11- Janitor's Closet	Domestic water fitting trowelled-on insulation						✓			
12- Offices, Health Suite, and Lounge	Heating system preformed pipe insulation						✓			
	Heating system fitting trowelled-on insulation						✓			
	Domestic water fitting trowelled-on insulation						✓			

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 7/94

SURVEYOR: Burgess

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Vinyl asbestos tile						✓			
83- Library	Vinyl asbestos tile						✓			

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 12/89 SURVEYOR: E. Pinto

SCHOOL NO: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
01- Boiler Room	Boiler breeching block and trowelled-on insulation								✓	
	Hot water generator block and trowelled-on insulation								✓	
	Heating system preformed pipe insulation								✓	
	Heating system fitting and valve trowelled-on insulation								✓	
	Domestic water fitting and valve trowelled-on insulation								✓	
	Fire door								✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 12/94

SURVEYOR: E. Briggs

SCHOOL NO: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
02- Crawl Space	Heating system preformed pipe insulation								✓	
	Heating system fitting trowelled-on insulation								✓	
	Domestic water fitting trowelled-on insulation								✓	
03- Above Suspended Ceilings and in Pipe Chases	Heating system preformed pipe insulation								✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 12/94 SURVEYOR: E. Swiess

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Heating system fitting trowelled-on insulation								✓	
	Domestic water fitting trowelled-on insulation								✓	
04- Cafeteria	Vinyl asbestos tile								✓	
	Fire doors (2)								✓	
05- Incinerator Room	Domestic water fitting trowelled-on insulation								✓	
	Fire door								✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 12/94

SURVEYOR: E Burgess

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
06- Hallways and Stairwells	Heating system preformed pipe insulation								✓	
	Heating system fitting trowelled-on insulation								✓	
	Vinyl asbestos tile								✓	
07- Storage Areas	Heating system preformed pipe insulation								✓	
	Heating system fitting trowelled-on insulation								✓	
	Domestic water fitting trowelled-on insulation								✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 12/96

SURVEYOR: E. Gaines

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
08- Classrooms	Heating system preformed pipe insulation								✓	
	Heating system fitting trowelled-on insulation								✓	
	Vinyl asbestos tile								✓	
09- Multi-Purpose Room and Stage	Heating system preformed pipe insulation								✓	
	Heating system fitting trowelled-on insulation								✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 12/84

SCHOOL NO.: PS221

SURVEYOR: Swiss

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation								✓	
	Vinyl asbestos tile								✓	
	Fire doors (2)								✓	
10- Toilets	Heating system preformed pipe insulation								✓	
	Heating system fitting trowelled-on insulation								✓	
	Domestic water fitting trowelled-on insulation								✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 12/90 SURVEYOR: Burgess

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Roof drain fitting trowelled-on insulation								✓	
11- Janitor's Closet	Domestic water fitting trowelled-on insulation								✓	
12- Offices, Health Suite, and Lounge	Heating system preformed pipe insulation								✓	
	Heating system fitting trowelled-on insulation								✓	
	Domestic water fitting trowelled-on insulation								✓	

FIGURE 7-1. QUARTERLY SURVEILLANCE REPORT FORM

DATE: 12/94

SURVEYOR: Briggs

SCHOOL NO.: PS221

FUNCTIONAL SPACE	MANAGEMENT AREA DESCRIPTION	CONDITION CHANGE								COMMENTS
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		
		Yes	No	Yes	No	Yes	No	Yes	No	
	Vinyl asbestos tile								✓	
13- Library	Vinyl asbestos tile								✓	

City of Baltimore Public Schools

AHERA Actions

Building: **PS221**

Job No EL1149 Start Date 12/28/93 Completion Date 12/21/93

Reason for the Action REMOVE AND DISPOSE OF APPROX. 110 SQ. FT. OF TANK INSUL. FROM THE BOILER ROOM. TANK IS LEAKING AND IN NEED OF REPAIR.

Written Description of Action and Methods

See Daily Job Reports for the following Invoices (Attached)

1/13/94 Inv# 100979

Contractor Information

MARCOR Environmental, Inc.
6679 Santa Barbara Road Suite G
Elkridge, Maryland 21227
Tel (410) 796-5991

Maryland State Asbestos License No. M21-03-005 Expiration 6/29/95
AHERA Recertification No. 4779 Expiration 5/04/95 (Supervisor - Al Horak, Jr.)

List of Employees on Job, Accreditation Numbers, & Expiration Dates

See Attached Employee List, and Daily Job Reports

Location of Disposal Site, Waste Manifast Included

PST Reclaimation
Brooklyn Park, Maryland

City of Baltimore Public Schools

AHERA Industrial Hygiene / Air Monitoring Information

Building: **PS221**

Job No EL1149 Start Date 12/28/93 Completion Date 12/21/93

Analyzing Lab

IH Services, Inc.
1521 Edgewood Street
Baltimore, Maryland 21224

Name of person collecting air samples

Method

Results

Name of Analyst

See Attached Analysis Sheets

Statement that Lab meets applicable requirements

IH Services, Inc. meets the applicable requirements of 40 CFR Part 763 Section 763.90 (i) (2) (ii). The American Industrial Hygiene Association Proficiency Analytical Testing Laboratory number is 21224-002. All other laboratories used by IH Services, Inc. for the analysis of samples also meet the applicable requirements of 40 CFR Part 763 Section 763.90 (i) (2) (ii).

MARCOR ENVIRONMENTAL

MARCOR Environmental, Inc.
6679-G Santa Barbara Road
Elkridge, MD 21227

410-796-5991
410-796-9446 (FAX)
800-666-0741

DATE: December 28, 1993

TO: DAVE MITCHELL / CITY OF BALTIMORE

FROM: Chris E. Christian / Project Manager

RE: NOTICE OF ASBESTOS HAZARD ABATEMENT ACTIVITIES

Important Notice: MARCOR and its agents have no knowledge as to the Contractual arrangements with other employers who may be on the premises during abatement procedures. It is incumbent upon you to notify these other employers of the scheduled asbestos abatement activities and the requirements of 29 CFR 1926.58 pertaining to the establishment of "regulated areas." Please direct any questions concerning this notification to me.

In accordance with 29 CFR 1926.58 (OSHA Asbestos Standard for Construction) you are hereby notified that MARCOR Environmental, Inc. has been contracted to perform certain asbestos abatement procedures on or about the premises of:

MT. WASHINGTON ELEMENTARY #221
1801 SULGRAVE AVENUE

Baltimore, MD 21209

JOB NUMBER: EL-00001-149

See attached notification:
(Areas of Abatement)

Abatement procedures are scheduled to begin on 12/28/1993 and continue through 12/31/1993.

The nature of abatement will include but not be limited to:
(See attached notification)

MARYLAND DEPARTMENT OF THE ENVIRONMENT, AIR MANAGEMENT ADMINISTRATION
DIVISION OF ASBESTOS AND INDOOR AIR QUALITY CONTROL
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224 (410)631-3200

ASBESTOS REMOVAL/DEMOLITION/RENOVATION PROJECT NOTIFICATION

Contractor Proj #: EL-00001-149

I. FACILITY LOCATION (Include Building Name, Number & Floor or Room Number)

SITE/BUILDING NAME: MT. WASHINGTON ELEMENTARY #221
ADDRESS: 1801 SULGRAVE AVENUE

Baltimore STATE: MD ZIP: 21209

SITE DESCRIPTION LOCATION: IN THE BOILER ROOM

COUNTY: 24 BALTIMORE CITY

II. FACILITY INFORMATION:

OWNER NAME: CITY OF BALTIMORE
ADDRESS: 2011 LINDEN AVENUE

CITY: BALTIMORE STATE: MD ZIP: 21217
CONTACT: DAVE MITCHELL TELEPHONE: (410)396-7832

MD LICENSE #: M21-03-005 REMOVAL CONTRACTOR: HARCOR Environmental, Inc.
ADDRESS: 6679 Santa Barbara Road

CITY: Elkridge STATE: MD ZIP: 21227
CONTACT: Chris E. Christian TELEPHONE: (410)796-5991

OTHER OPERATOR:
ADDRESS:

CITY: STATE: ZIP:
CONTACT: TELEPHONE: ( ) -

III. FACILITY DESCRIPTION:

BUILDING SIZE: Sq.Ft. 149,000 Age in Years: 29

BUILDING SIZE: Ln.Ft. N/A # of Floors: 2

IV. TYPE OF OPERATION: [√] R-RENOVATION

V. IS ASBESTOS PRESENT? YES

VI. TYPE OF NOTIFICATION: [√] O-Original [ ] C-Canceled [ ] R-Revised

[ ] NESHAP [√] NON-NESHAP

If revised, enter Resubmit Date / /

FOR MDE OFFICE USE ONLY

DUPLICATE (Yes / No)	DATE RECEIVED	Postmark	Notification #

ASBESTOS REMOVAL/DEMOLITION/RENOVATION PROJECT NOTIFICATION

VII. SCHEDULED DATES ASBESTOS REMOVAL: (MM/DD/YY)

Start: 12/28/1993

Complete: 12/31/1993

VIII. SCHEDULED DATES DEMO/RENOVATION: (MM/DD/YY)

Start: 12/28/1993

Complete: 12/31/1993

Prep: / /

IX. DESCRIBE PRIMARY USE OF FACILITY OR ENTER CODES:

H-Hospital, S-School, P-Public Building, O-Office, B-Ship
I-Industrial, U-University/Coollege, C-Commercial or R-Residence

PRESENT USE: PUBLIC SCHOOL

PRIOR USE: PUBLIC SCHOOL

X. PROCEDURE, INCLUDING ANALYTICAL METHOD, IF APPROPRIATE, USED TO DETECT THE PRESENCE OF ASBESTOS:

Owner Provided Information.

QUANTITY OF ASBESTOS	RACM to be removed	NONFRIABLE ASBESTOS NOT REMOVED		UNIT OF MEASUREMENT
		Cat.I	Cat II	Unit
Pipes				LnFt: Ln m:
Surface Area	110			SqFt: XXX Sq m:
Vol RACM Off Facility Component				CuFt: Cu m:

XI. DESCRIPTION OF PLANNED DEMOLITION OR RENOVATION WORK AND METHOD(S) TO BE USED:
Remove and dispose of approximately 110 square feet of tank insulation from the boiler room. Tank is leaking and in need of repair. All work will be done in accordance with all government, state, and local regulations. Set up area containment, establish negative air, wet material using amended water, use approved asbestos removal procedures and disposal, air monitor.

XII. DESCRIPTION OF WORK PRACTICES AND ENGINEERING CONTROL TO BE USED TO PREVENT EMISSIONS OF ASBESTOS AT THE DEMOLITION AND RENOVATION SITE:

XIII. WASTE TRANSPORTER #1
NAME: Jones Minority Services, Inc.
ADDRESS: 752 Stinchcomb Road
Severna Park STATE: MD ZIP: 21146
CONTACT: Carol Jones TELEPHONE: (410)789-5700

WASTE TRANSPORTER #2
NAME:
ADDRESS:
STATE: ZIP:
CONTACT: TELEPHONE: ( ) -

XIV. WASTE DISPOSAL SITE
NAME: PST Reclamation, Inc.
ADDRESS: Rubble Landfill
4431 Sands Road
Harwood STATE: MD ZIP: 20776
CONTACT: Torrance Lewis TELEPHONE: (410)741-1776

ASBESTOS REMOVAL/DEMOLITION/RENOVATION PROJECT NOTIFICATION

XV. IF DEMOLITION ORDERED BY A GOVERNMENT AGENCY, PLEASE IDENTIFY THE AGENCY BELOW:

Name: Title:

Authority:

Date of Order (MM/DD/YY): Date Ordered to Begin (MM/DD/YY):

XVI. 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:

XVII. 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.
Work area will be immediately contained and access restricted. Asbestos clean up procedures will begin with wet removal using amended water and air monitoring.

XVIII. 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: i.e. EFFECTIVE 1/20/91).

(Signature of Owner / Operator) 12/28/93 (Date)

XIX. I CERTIFY THAT THE ABOVE INFORMATION IS CORRECT.

(Signature of Owner / Operator) 12/28/93 (Date)

IN ADDITION TO THE INFORMATION REQUIRED BY NESHAP REGULATIONS, MARYLAND REQUIRES THAT THE FOLLOWING INFORMATION BE PROVIDED AT THE TIME OF NOTIFICATION: EMPLOYEE INFORMATION. ON A SEPARATE PAGE, PROVIDE THE FOLLOWING INFORMATION FOR EACH EMPLOYEE NOT LISTED ON SCHEDULE I OF "APPLICATION FOR LICENSE TO REMOVE/ENCAPSULATE ASBESTOS" WHO WILL HANDLE ASBESTOS ON THIS PROJECT:

A) FULL NAME;
B) SOCIAL SECURITY NUMBER;
C) NAME OF ORGANIZATION THAT PROVIDED APPROVED TRAINING COURSE; AND
D) DATE OF MOST RECENT APPROVED TRAINING COURSE ATTENDED.

WORK SCHEDULE. SPECIFY IF WEEKEND ONLY, NIGHT SHIFT, ETC.

MONDAY THROUGH FRIDAY DURING THE HOURS 0700 TO 1530

MARCOR ENVIRONMENTAL, INC

MARCOR ENVIRONMENTAL

Remit Payments to:
P.O. Box 630039
Baltimore, Maryland 21263

CUSTOMER
C00083
INV. #
100979

BILL TO

ASBESTOS COORDINATOR
3611 LINDEN AVENUE
BALTIMORE, MD 21217

JOB LOCATION

INVOICE DATE: 01/13/91
MARCOR JOB #: EL-00061-119
CUSTOMER REF. #: BP-17192
STATE WORK PERFORMED: MD
PAGE NUMBER: 1

ATTENTION: DAVE MITCHELL

==========

JOB NAME: MT. WASHINGTON ELEMENTARY #221

JOB LOCATION: MT. WASHINGTON ELEMENTARY #221
1801 SULGRAVE AVENUE
BALTIMORE, MD 21209

BALTIMORE CITY

PARTIAL BILLING

AMOUNT EARNED THIS INVOICE	$	3,238.77
AMOUNT DUE THIS INVOICE	$	3,238.77

REMIT PAYMENT TO: P.O. BOX 630039, BALTIMORE, MD 21263
THANK YOU FOR ALLOWING MARCOR TO BE YOUR ENVIRONMENTAL CONTRACTOR
WE LOOK FORWARD TO BEING OF SERVICE TO YOU IN THE FUTURE.
IF YOU HAVE ANY QUESTIONS. PLEASE CONTACT AL HORAK AT (410) 796-5991.

ERMS: DUE UPON RECEIPT WITH SERVICE CHARGES OF 1.5% PER MONTH ON UNPAID BALANCE. PERCENTAGE RATE EQUAL TO 18% PER ANNUM.
MARCOR RESERVES THE RIGHT TO APPLY PAYMENTS TO SERVICE CHARGES OR OLDEST INVOICES FIRST.

MARCOR TIME & MATERIAL RATES

BALTIMORE CITY
ASBESTOS ABATEMENT SERVICES
CONTRACT # BP-17492
DATE: 13-Jan-94

Job #: EL-00001-149
Name: MT. WASHINGTON ELEM. #221
Address: 1801 SULGRAVE AVE.
BALTIMORE, MD

ITEM #	ITEM	UNIT	UNIT PRICE	QTY	EXTENDED PRICE
LABOR:					
1	Superintendent	hrs	$0.00	16	0.00
	Overtime	hrs	0.00		0.00
2	Asbestos Worker	hrs	0.00		0.00
	Overtime	hrs	0.00		0.00
3	Carpenter	hrs	55.00		0.00
	Overtime	hrs	0.00		0.00
4	Laborers	hrs	28.25	48	1,356.00
	Overtime	hrs	0.00		0.00
TOTAL LABOR					$1,356.00
EQUIPMENT					
1	HEPA Vacuums	per hour	0.00		0.00
2	PAPR's	per hour	0.00		0.00
3	Class "C" Air System	per hour	0.00		0.00
4	Negative Air Unit	per hour	0.00		0.00
5	Shower Assembly	per hour	0.00		0.00
TOTAL EQUIPMENT CHARGES					$0.00
MATERIAL:					
1	Poly Sheeting 6Ml 20'	roll	$38.50	2	$77.00
2	Poly Sheeting 6Ml 16'	roll	38.50		0.00
3	Millipore Cassettes	each	1.22		0.00
4	Drums w/Caution Label	drum	7.20		0.00
5	Duct Tape	roll	4.74	17	80.58
6	Encapsulant (Bridging)	gal	20.78	0.25	5.20
7	Encapsulant (Penetrating)	gal	8.02	2	16.04
8	Gloves	pr	1.22		0.00
9	Light Bulbs	each	1.74		0.00
10	Microtrap Filter	each	2.79	2	5.58
11	Microtrap Prefilter	each	0.58	2	1.16
12	Microtrap HEPA Filter	ea	142.75		0.00
13	6Ml Asb.Disposal Bag (Labeled)	ea	0.45		0.00
14	Propane	bottle	7.50		0.00
15	Rags	lbs	0.49	30	14.70
16	Respirator Filters "A"	ea	2.90		0.00
17	Respirator Filters PAPR	ea	10.98		0.00
18	Re-wettable Cloth 60"	per ft.	9.80		0.00
19	Asbestos Caution Signs	each	0.27		0.00

MARCOR TIME & MATERIAL RATES

BALTIMORE CITY
ASBESTOS ABATEMENT SERVICES
CONTRACT # BP-17492
DATE: 13-Jan-94

Job #: EL-00001-149
Name: MT. WASHINGTON ELEM. #221
Address: 1801 SULGRAVE AVE.
BALTIMORE, MD

ITEM #	ITEM	UNIT	UNIT PRICE	QTY	EXTENDED PRICE
20	Spray Adhesive	can	2.05	8	16.40
21	Spray Paint	can	5.63		0.00
22	Self Stickpins w/washers	ea	0.10		0.00
23	Disposeable Coveralls (Full)	case (25)	57.48		0.00
24	Vacuum Bags GS81	each	2.43		0.00
25	Vacuum Bags GS82	each	9.57		0.00
26	HEPA Vacuum Filter	each	211.74		0.00
27	Wire Brushes 4 inch	each	1.85	4	7.40
28	Wire Brushes 6 inch	each	1.50		0.00
29	Wetting Agent	gal	9.84	1	9.84
30	Glove Bags	ea	3.67	90	330.30
31	Mop Head	ea	3.95		0.00
32	Paint Brushes	ea	1.90		0.00
33	Shower Towels	ea	0.11		0.00
34	Asbestos waste labels	ea	0.06		0.00
35	Smoke tubes	ea	4.78	1	4.78
36	Exhaust Duct	100' Roll	17.85		0.00
37	Stapler	each	30.85		0.00
38	Lock (dumpster)	each	16.55		0.00
39	Qwik Scrub	each	2.33		0.00
40	Sawblades	invoice	0.00		0.00
41	Parking	receipts	0.00		0.00
42	Materials	receipts	0.00		0.00
TOTAL MATERIAL					$568.98
MISCELLANEOUS:					
1	BENDIX Pump Calibration	pump mth	$20.00		$0.00
2	Disposal	cu. yd.	80.00		0.00
3	Lab Analysis (normal)	cassette	35.00		0.00
4	Lab Air Analysis (24 hr.Serv)	each	70.00		0.00
5	Industrial Hygienist	hr	50.00		0.00
6	Meal Allowance	man/day	15.00		0.00
7	Subcontract	job	1000.00		1,000.00
8	Rentals	job	0.00		0.00
9	Job site delivery/pick-up	ea.			0.00
10	Mileage	ea mile	0.20		0.00
11	Lodging/Travel+25%				0.00
12	Gas for job equipment	per ticket			0.00
TOTAL MISCELLANEOUS					$1,000.00

MARCOR TIME & MATERIAL RATES

BALTIMORE CITY
ASBESTOS ABATEMENT SERVICES
CONTRACT # BP-17492
DATE: 13-Jan-94

Job #: EL-00001-149
Name: MT. WASHINGTON ELEM. #221
Address: 1801 SULGRAVE AVE.
BALTIMORE, MD

ITEM #	ITEM	UNIT	UNIT PRICE	QTY	EXTENDED PRICE
SUMMARY:					
	LABOR				$1,356.00
	EQUIPMENT				0.00
	MATERIALS				568.98
	MISCELLANEOUS				1,000.00
	MARK-UP ON MATERIALS	20.00%			113.80
	MARK-UP ON SUB-CONTRACTS	20.00%			200.00
	MARK-UP ON RENTALS	10.00%			0.00
GRAND TOTAL					$3,238.77

ARCOR

DAILY JOB REPORT--ABATEMENT OPERATIONS

SIDE

JOB NUMBER: OFFICE CODE EL · CONTRACT NUMBER 00001 · WORK ORDER # 149

DATE WORK PERFORMED: Dec. 29.93 PAGE: 1 OF 1

PREPARED BY: Khanty SUPERVISOR'S SIGNATURE ON: WED.

JOB NAME: MT. WASHINGTON ELEM. SCH #221

JOB LOCATION: 1801 SULGRAVE AVE, / BOILER ROOM TALK.

LABOR USED

EMPLOYEE NUMBER	EMPLOYEE NAME	START TIME	STOP TIME	HOURS WORKED	DAY HOURS	NIGHT HOURS	TITLE	PROF. LEVEL	MILEAGE REIMB.	EMPLOYEE SIGNATURE
013350	KHANTY KHANTY	0800	1630	8	8	-	SP	-	-	Khanty Khanty
008329	MICHAEL BLAND	0800	1630	8	8	-	TECH	-		Michael Bland
012500	DAC LEM	0800	1630	8	8	-	TECH	-	-	Dac Lem
004880	HUNG DUONG	0800	1630	8	8	-	TECH	-		Hung Duong
	TOTAL HOURS TO BE PAID									

AIR TECHNICIAN'S NAME: Michael Dangelo

AIR TECHNICIAN'S SIGNATURE: Michael Dangelo

MATERIALS USED

DESCRIPTION	UNIT	ITEM CODE	UNITS USED
ADHESIVE--FORMULA 1M-1216	POUND	300	
BAGS--6 MIL AND 10 MIL-DISPOSAL	EACH	380	
BAGS-GLOVE BAGS--ALL SIZES-ASBESTOS	EACH	420	10.
BARRIER TAPE-CAUTION/DANGER-1000' ROLL	ROLL	450	
CARTRIDGES--HEPA	EACH	820	
CARTRIDGES--ORGANIC VAPOR/HEPA	EACH	860	
DETECTOR TUBES-SMOKE	EACH	1300	1.
DRUMS--FIBER	EACH	1540	
DUCT TAPE--2" X 60'	ROLL	1580	2.
DUCT TAPE--3" X 60'	ROLL	1620	12.
DUCT TAPE--TWO SIDED	ROLL	1660	
ENCAPSULANT-BRIDGING	GALLON	1700	
ENCAPSULANT-HIGH TEMPERATURE	GALLON	1740	
ENCAPSULANT-PENETRATING	GALLON	1780	
EXHAUST DUCT	ROLL	1820	
FILTERS--3K NEGATIVE AIR BOX FILTERS	EACH	1860	1.
FILTERS--3K NEGATIVE AIR HEPA FILTERS	EACH	1900	
FILTERS--3K NEGATIVE AIR PREFILTERS	EACH	1940	1.
FILTERS--4K NEGATIVE AIR BOX FILTERS	EACH	1980	
FILTERS--4K NEGATIVE AIR HEPA FILTERS	EACH	2020	
FILTERS--4K NEGATIVE AIR PREFILTERS	EACH	2060	
FILTERS--SOCK FILTER--1 TO 30 MICRONS	EACH	2100	
FILTERS-VACUUM--DACRON	EACH	2140	
FILTERS-VACUUM--HEPA	EACH	2180	
GLOVES--NEOPRENE	PAIR	2220	
GLOVES--NITRILE	PAIR	2260	
GLOVES--PVA	PAIR	2300	
GLOVES--PVC	PAIR	2340	
GLOVES--SILVER SHIELD	PAIR	2380	
LIGHT BULBS	EACH	2420	
MARKING TAPE	ROLL	2460	

DESCRIPTION	UNIT	ITEM CODE	UNITS USED
MASTIC REMOVER	EACH	2900	
MICRO-MANOMETER PAPER	EACH	2940	
MICRO-MANOMETER PENS	EACH	2980	
MILLIPORE CASETTES	EACH	3020	
MOP HEADS	EACH	3060	
PADLOCKS	EACH	3100	
PAINT BRUSHES AND ROLLERS	EACH	3140	
PLASTIC LINERS--3 MIL--100 PER CARTON	CARTON	3180	
PLASTIC LINERS--6 MIL--100 PER CARTON	CARTON	3220	
POLY SHEETING--10 MIL	ROLL	3260	
POLY SHEETING--6 MIL	ROLL	3300	-1.
POLY SHEETING--FIRE RETARDANT	ROLL	3340	
POLY SHEETING--NYLON REINFORCED	ROLL	3380	
PROTECTIVE SUITS--ASBESTOS	EACH	3660	
QUICK SCRUB (SCRUBBER GRILL)	EACH	4140	
RAGS	POUND	4180	
REWETTABLE CLOTH 60"	LIN FT	4220	
SAFETY FENCE--50 FOOT ROLL	ROLL	4260	
SCRAPERS	EACH	4420	
SHOWER TOWELS	EACH	4800	
SIGNS-DANGER	EACH	4840	
SPRAY ADHESIVE	CAN	4880	8.
SPRAY FOAM	CAN	4960	
SPRAY PAINT	CAN	4900	
SPRAY POLY	GALLON	4940	
VACUUM BAGS	EACH	4980	
WASTE BOXES	EACH	5100	
WASTE LABELS	EACH	5140	
WETTING AGENT (SURFACTANT)	GALLON	5540	
WIRE BRUSHES	EACH	5580	

SPECIAL NOTES, VISITORS TO THE SITE AND MISCELLANEOUS COMMENTS

AMOUNT OF DISPOSAL: N/A

AIR SAMPLING INFORMATION

TYPE	QUANTITY	NUMBER	RESULTS
PRELIMINARY	2	MW-01-01	0.01
T.W.A.			
O.W.A.	4	MW-01-01	0.01
PERSONAL			
FINAL			

ASBESTOS IN WORK AREA NOT PART OF SCOPE: YES NO (IF YES COMPLETE FORM)

ASBESTOS HANDLED BY OTHERS: YES NO

VISITORS TO THE SITE:

NAME	
NAME	
NAME	N/A
NAME	

ACETYLENE TORCH SET	9050		PUMP--PLASTIC DIAPHRAGM PUMP-1"	9420	
AIR COMPRESSOR--PORTABLE < 100 CFM	9060		PUMP--SUBMERSIBLE PUMP--2"	9430	
AIR COMPRESSOR--TYPE "C"--PORTABLE	9070		PUMP--SUBMERSIBLE PUMP--3"	9440	
BACKHOE LOADER	9080		PUMP--SUBMERSIBLE PUMP--4"	9450	
BEAD BLASTER	9090		PUMP--SUMP PUMP	9460	
BELT SKIMMER	9100		PUMP--TRANSFER PUMP	9470	
BLOWER-1 H.P.	9110		PUMP--TRASH PUMP-100 GPM	9480	
BLOWER-1.5 H.P.	9120		PUMP-ACID HAND PUMP	9490	
CONTAINMENT BOOM	9130		RADIOS--2 WAY	9500	
COPUS BLOWER SYSTEM	9140		ROOF WARRIOR	9510	
DECONTAMINATION TRAILER	9150		SAFETY LIFT TRIPOD AND HARNESS	9520	
DRUM LIFT (1000 LBS.)	9160		SAW-ABRASIVE CUT-OFF	9530	
DRUM VACUUM	9170		SAW-CHAIN--ELECTRIC OR GAS	9540	
EXPLOSION PROOF FAN	9180		SAW-CONCRETE -14HP W/DIAMOND BLADE	9550	
GUZZLER	9190		SAW-PORTABLE CONCRETE	9560	
HAMMER DRILL-ROTARY	9200		SAW-ROOF SAW	9570	
HARBOR BOOM	9220		SAWZALL--ELECTRIC AND AIR	9580	
HIGH VOLUME AIR MONITORING PUMP	9230		SCAFFOLDING-4' SECTION	9590	
IMPACT CORER	9240		SHOWER PUMP AND ASSEMBLY	9600	
JACKHAMMER WITH AIR COMPRESSOR	9250		SHREDDER	9610	
JACKHAMMER-ELECTRIC	9260		SKID LOADER (BOBCAT)	9620	
MANWAY LIFTERS/LIFTING EYES	9270		SLIDE HAMMER	9630	
NEGATIVE AIR UNIT-2K OR LESS	9280	1.	SMALL PORTABLE GENERATOR	9640	
NEGATIVE AIR UNIT-6K	9290		STAKE BODY TRUCK-(RACK)	9650	
PERSONAL AIR PUMP	9300		TAMPER-JUMPING JACK	9660	
PNEUMATIC SCRAPER	9310		THREE-STAGE AIR LOCK ASSEMBLY	9670	
PORTABLE ELECTRIC PANEL	9320		TRUCKS--BOX-TRUCK-HI CUBE	9680	
PORTABLE LIGHTING SYSTEM	9330		TRUCKS--DUMP TRUCK	9690	
POWER WASHER--HOT WATER-UP TO 3K PSI	9340		TRUCKS--WATER TRUCK	9700	
POWER WASHER-UP TO 2K PSI	9350		TRUCKS--SERVICE VEHICLES < 1 TON	9710	
POWER WASHER-UP TO 5K PSI	9360		TRUCKS--SERVICE VEHICLES < 10 TONS	9720	
POWER WASHER-UP TO 10K PSI	9370		TRUCKS--SERVICE VEHICLES > 10 TONS	9730	
POWERED AIR PURIFYING RESPIRATOR	9380		TRUCKS--VACUUM TANKER-3500 GALLON	9740	
PRESSURE DIFFERENTIAL RECORDER	9390		VACUUMS--HEPA 82' VAC.	9750	1.
PUMP--DIAPHRAGM PUMP-2"	9400		WELDER	9760	
PUMP--DRUM PUMP	9410		2X4'@ 128'-77		
Ext. cord 4.			Plastic Bucket 1.		
water hoses 150 F.			nozzle 1.		

DESCRIPTION OF WORK PERFORMED

unloading materials and equipment out from warehouse truck and we are started to set-up the tent cover the hot water tank. Turn pole on wall and floor. with (3) three stage airlock set about 1000 lbs completed and we are cleaned off and went home

CUSTOMER'S SIGNATURE

ARCOR

DAILY JOB REPORT--ABATEMENT OPERATIONS

SIDE 1

JOB NUMBER: OFFICE CODE EZ · CONTRACT NUMBER 00001 · WORK ORDER 149

JOB NAME: Mt. Washington Elem. School

DATE WORK PERFORMED: DEC, 30.93 PAGE: 1 OF 1

JOB LOCATION: 1801 Sulgrave Ave / Boiler Room Tank

PREPARED BY: [signature] SUPERVISOR'S SIGNATURE ON: [signature]

LABOR USED

EMPLOYEE NUMBER	EMPLOYEE NAME	START TIME	STOP TIME	HOURS WORKED	DAY HOURS	NIGHT HOURS	TITLE	PROT. LEVEL	MILEAGE REIMB.	EMPLOYEE SIGNATURE
011350	Khamis Khanty	0700	1530	8	8	-	SP	-	-	[signature]
002339	Michael Bland	0700	1530	8	8	-	TECH	-	-	[signature]
012500	Phae Lam	0700	1530	8	8	-	TECH	-	-	[signature]
001490	Hung Duong	0700	1530	8	8	-	TECH	-	-	[signature]
	TOTAL HOURS TO BE PAID									

AIR TECHNICIAN'S NAME: Michael Bagino AIR TECHNICIAN'S SIGNATURE: [signature]

MATERIALS USED

DESCRIPTION	UNIT	ITEM CODE	UNITS USED
ABSORBENT--FORMULA 1H-1214	POUND	300	
BAGS--6 MIL AND 10 MIL-DISPOSAL	EACH	380	
BAGS-GLOVE BAGS--ALL SIZES-ASBESTOS	EACH	420	80.
BARRIER TAPE-CAUTION/DANGER-1000' ROLL	ROLL	460	
CARTRIDGES--HEPA	EACH	020	
CARTRIDGES--ORGANIC VAPOR/HEPA	EACH	060	
DETECTOR TUBES-SMOKE	EACH	1300	
DRUMS--FIBER	EACH	1540	
DUCT TAPE--2" X 60'	ROLL	1580	1-
DUCT TAPE--3" X 60'	ROLL	1620	8.
DUCT TAPE--TWO SIDED	ROLL	1660	
ENCAPSULANT-BRIDGING 32.32	GALLON	1700	1/4
ENCAPSULANT-HIGH TEMPERATURE	GALLON	1740	
ENCAPSULANT-PENETRATING 32.22	GALLON	1780	2.
EXHAUST DUCT	ROLL	1820	
FILTERS--2K NEGATIVE AIR BOX FILTERS	EACH	1860	1-
FILTERS--2K NEGATIVE AIR HEPA FILTERS	EACH	1900	
FILTERS--2K NEGATIVE AIR PREFILTERS	EACH	1940	1-
FILTERS--4K NEGATIVE AIR BOX FILTERS	EACH	1980	
FILTERS--4K NEGATIVE AIR HEPA FILTERS	EACH	2020	
FILTERS--4K NEGATIVE AIR PREFILTERS	EACH	2060	
FILTERS--SOCK FILTER--1 TO 20 MICRONS	EACH	2100	
FILTERS-VACUUM--DACRON	EACH	2140	
FILTERS-VACUUM--HEPA	EACH	2180	
GLOVES--NEOPRENE	PAIR	2220	
GLOVES--NITRILE	PAIR	2260	
GLOVES--PVA	PAIR	2300	
GLOVES--PVC	PAIR	2340	
GLOVES--SILVER SHIELD	PAIR	2380	
LIGHT BULBS	EACH	2420	
MASKING TAPE	ROLL	2460	

DESCRIPTION	UNIT	ITEM CODE	UNITS USED
PLASTIC REMOVER	EACH	2900	
MICRO-MANOMETER PAPER	EACH	2940	
MICRO-MANOMETER PENS	EACH	2980	
MILLIPORE CASETTES	EACH	3020	
MOP HEADS	EACH	3060	
PADLOCKS	EACH	3100	
PAINT BRUSHES AND ROLLERS	EACH	3140	
PLASTIC LINERS--3 MIL--100 PER CARTON	CARTON	3180	
PLASTIC LINERS--6 MIL--100 PER CARTON	CARTON	3220	
POLY SHEETING--10 MIL	ROLL	3260	
POLY SHEETING--6 MIL	ROLL	3300	1.
POLY SHEETING--FIRE RETARDANT	ROLL	3340	
POLY SHEETING--NYLON REINFORCED	ROLL	3380	
PROTECTIVE SUITS--ASBESTOS	EACH	3660	10.
QUICK SCRUB (SCRUBBER GRILL)	EACH	4140	
RAGS	POUND	4180	30.
RENETTABLE CLOTH 60"	LIN FT	4220	
SAFETY FENCE--50 FOOT ROLL	ROLL	4260	
SCRAPERS	EACH	4420	
SHOWER TOWELS	EACH	4500	
SIGNS-DANGER	EACH	4540	
SPRAY ADHESIVE	CAN	4820	
SPRAY FOAM	CAN	4860	
SPRAY PAINT	CAN	4900	
SPRAY POLY	GALLON	4940	
VACUUM BAGS	EACH	4980	
WASTE BOXES	EACH	5100	
WASTE LABELS	EACH	5140	
WETTING AGENT (SURFACTANT)	GALLON	5540	1-
WIRE BRUSHES	EACH	5580	4.

SPECIAL NOTES, VISITORS TO THE SITE AND MISCELLANEOUS COMMENTS

AMOUNT OF DISPOSAL: 35 Bags

ASBESTOS IN WORK AREA NOT PART OF SCOPE: YES NO

ASBESTOS HANDLED BY OTHERS: YES NO IF YES COMPLETE FORM

AIR SAMPLING INFORMATION

TYPE	QUANTITY	NUMBER	RESULTS
PRELIMINARY			
I.W.A.	1	MW-012	
O.W.A.	1	MW-013	LO.01
PERSONAL	1	MW-011	
FINAL	5	MW-14-18	LO-01

VISITORS TO THE SITE:

NAME	
NAME	
NAME	
NAME	

ACETYLENE TORCH SET	9050		PUMP--PLASTIC DIAPHRAGM PUMP-1"	9420	
AIR COMPRESSOR--PORTABLE < 100 CFM	9060		PUMP--SUBMERSIBLE PUMP--2"	9430	
AIR COMPRESSOR--TYPE "C"--PORTABLE	9070		PUMP--SUBMERSIBLE PUMP--3"	9440	
BACKHOE LOADER	9080		PUMP--SUBMERSIBLE PUMP--4"	9450	
BEAD BLASTER	9090		PUMP--SUMP PUMP	9460	
BELT SKIMMER	9100		PUMP--TRANSFER PUMP	9470	
BLOWER-1 H.P.	9110		PUMP--TRASH PUMP-100 GPM	9480	
BLOWER-1.5 H.P.	9120		PUMP-ACID HAND PUMP	9490	
CONTAINMENT BOOM	9130		RADIOS--2 WAY	9500	
COPUS BLOWER SYSTEM	9140		ROOF WARRIOR	9510	
DECONTAMINATION TRAILER	9150		SAFETY LIFT TRIPOD AND HARNESS	9520	
DRUM LIFT (1000 LBS.)	9160		SAW-ABRASIVE CUT-OFF	9530	
DRUM VACUUM	9170		SAW-CHAIN--ELECTRIC OR GAS	9540	
EXPLOSION PROOF FAN	9180		SAW-CONCRETE -14HP W/DIAMOND BLADE	9550	
GUZZLER	9190		SAW-PORTABLE CONCRETE	9560	
HAMMER DRILL-ROTARY	9200		SAW-ROOF SAW	9570	
HARBOR BOOM	9220		SAWZALL--ELECTRIC AND AIR	9580	
HIGH VOLUME AIR MONITORING PUMP	9230		SCAFFOLDING-4' SECTION	9590	
IMPACT CORER	9240		SHOWER PUMP AND ASSEMBLY	9600	
JACKHAMMER WITH AIR COMPRESSOR	9250		SHREDDER	9610	
JACKHAMMER-ELECTRIC	9260		SKID LOADER (BOBCAT)	9620	
MANWAY LIFTERS/LIFTING EYES	9270		SLIDE HAMMER	9630	
NEGATIVE AIR UNIT-2K OR LESS	9280		SMALL PORTABLE GENERATOR	9640	
NEGATIVE AIR UNIT-4K	9290		STAKE BODY TRUCK-(RACK)	9650	
PERSONAL AIR PUMP	9300		TAMPER-JUMPING JACK	9660	
PNEUMATIC SCRAPER	9310		THREE-STAGE AIR LOCK ASSEMBLY	9670	
PORTABLE ELECTRIC PANEL	9320		TRUCKS--BOX TRUCK-HI CUBE	9680	
PORTABLE LIGHTING SYSTEM	9330		TRUCKS--DUMP TRUCK	9690	
POWER WASHER--HOT WATER-UP TO 3K PSI	9340		TRUCKS--WATER TRUCK	9700	
POWER WASHER-UP TO 2K PSI	9350		TRUCKS--SERVICE VEHICLES < 1 TON	9710	
POWER WASHER-UP TO 5K PSI	9360		TRUCKS--SERVICE VEHICLES < 10 TONS	9720	
POWER WASHER-UP TO 10K PSI	9370		TRUCKS--SERVICE VEHICLES > 10 TONS	9730	
POWERED AIR PURIFYING RESPIRATOR	9380		TRUCKS--VACUUM TANKER-3500 GALLON	9740	
PRESSURE DIFFERENTIAL RECORDER	9390		VACUUMS--HEPA	9750	
PUMP--DIAPHRAGM PUMP-2"	9400		WELDER	9760	
PUMP--DRUM PUMP	9410				

DESCRIPTION OF WORK PERFORMED

Got ABOUT 100% COMPLETED SEALING OFF THE POLY. AND AIRLOCK. AND WE ARE STARTED TO REMOVE ASBESTOS OUT FROM HOT WATER TANK, AND DOING FINAL CLEANED. DOUBLE BAGS AND CARRING OUT FROM WORKING AREA AND CAPSULATE THE AREA

AND ALSO PASSING FOR FINAL AIR SAMPLE AND TORE DOWN THE AREA AND CLEANED OFF

CUSTOMER'S SIGNATURE	

I H SERVICES, INC

Remit Payment To: P.O. Box 9951
Baltimore, MD 21224
ATTN.: Accounts Receivable
PHONE: (410) 633-4000
FAX: (410) 633-4122

Federal I.D. Number
52-164[illegible]87

INVOICE NO. 3-509

INVOICE DATE Dec. 31, 1993

P.O. NO. EL00001-149

TO: Marcor Environmental
6679 Santa Barbara Road, Suite g
Baltimroe, MD 21227

Terms: Net 30 Days
Past Due Invoices Subject to
A Service Charge of 2% per month.

MT. WASHINGTON ELEMENTARY SCHOOL #221 Dec. 29 - 30, 1993

16	Regular IH hours @ $40.00/hour	$640.00
18	PCM Air samples @ $20.00/sample	$360.00

JOB NUMBER	DEPT	ACCOUNT	AMOUNT
EL 00001-149	111		$1000.00
			$
			$
			$
			$
HOLD (CIRCLE)		VOUCHER #	
APPROVAL BY		DATE 11/7/94	

TOTAL: $1000.00

Thank You! — We Appreciate Your Business

1631-B Portal Street
Baltimore, Maryland 21224

Stephen L. Law 11/7/94
Stephen L. Law, Ph.D., CIH
President

Submit to MARCOR in duplicate

Versar INC.

ASBESTOS-CONTAINING MATERIALS MANAGEMENT PLAN APPENDICES C, D, E, F, G, AND H

FOR

MOUNT WASHINGTON ELEMENTARY SCHOOL PS221

PREPARED FOR:

THE BOARD OF SCHOOL COMMISSIONERS
FOR THE CITY OF BALTIMORE

PREPARED BY:

VERSAR, INC.
6850 VERSAR CENTER
SPRINGFIELD, VA 22151

MAY 9, 1989

Versar INC.

APPENDIX C

RESPONSE ACTION SINCE INSPECTION

AHERA ACTIONS

#PS221

Project Name: Mt. WASHINGTON ELEMENTARY

Project Start: 6-10-88 Project End: 6-14-88

Reason for the Action:

Damaged ACM on Fan Housing + Damaged Pipe coverings

Written Description of Action and Methods:

Critical Barriers, Containment area set up with NA units. Removal, scraped, wire brushed, vacuum, wet wipe, mop. Repair WITH REWETTABLE. Encapsulate with 32-32

Name and Address of Contractor:

MARCOR OF Md.

State of Accreditation: ✓ Md.

Accreditation Number: ✓ 21-03-005

Date of Expiration: ✓ 6/29/89

List of Employees on job, Accreditation Numbers and Expiration date:

RONALD TUBONGBANUA

B. H. SOUVANNAVONG

KHAMOUNE MANIPHONE

Location of Disposal site, Waste Manifest Included:

S+S LANDFILL, 19 SOUTH

W. MILFORD, W. VA.

AHERA ACTIONS I.H. INFORMATION

Name of person collecting air sample: DENISE CALLAHAN

Signature: _____

Date: 6-10-88 / 6-13-88

Location: Mt. WASHINGTON ELEMENTARY

Name and address of analyzing lab:

AMA

Date of Analysis: 6-10-88 + 6-13-88

Method: NIOSH 7400

Results: 18506101 < 0.010 / 18506132 < 0.005 / 18506133 < 0.005
18506134 < 0.005 / 18506135 < 0.010

Name of Analysis: DENISE CALLAHAN

Signature: _____

Statement that Lab. meets applicable requirements:

GASCOYNE #21224-002

☒ T & M

☐ CONTRACT

DAILY JOB REPORT

Page 1 of 1

JOB NUMBER BA 7895 DAY Friday DATE 6-10-88

JOB NAME Mt. Washington Elem. Sch. ADDRESS 1801 Sylvave Avenue FOREMAN R. Tubongbanua

EMPLOYEE	START	STOP	HRS	EMPLOYEE SIGNATURE
Ronald G. Tubongbanua	7:00	3:30	8	Ronald G. Tubongbanua
Bounheuang Souvannavong	7:00	3:30	8	Bounheuang
Khamoune Maniphone	7:00	3:30	8	Khamoune
CARPENTRY				
B. H. Souvannavong			2	Bounheuang
Khamoune Maniphone			2	Khamoune
AIR TECH NAME: Denise Callahan	2:30	3:30		AIR TECH SIGNATURE: Denise Callahan

MATERIAL RECEIVED/USED

QTY.	RECEIVED	QTY.	RECEIVED	QTY.	USED	QTY.	USED	QTY.	USED	QTY.	USED
1/2 roll	C. poly	N.A	Filters	1 roll	Poly	2 lbs	Rags	—	Towels		
1 rolls	B. poly	3	B. Box	—	Cassettes	—	Comfo Fil.	—	Stickers		
300 pcs	Bags	3	B. Pre	—	Drums	—	Paor Fil.	—	Ribbon		
5 pcs	G. Bags	2	Sm. Box	10 rolls	Tape	—	Rewet.	—	Scrapers		
27 lbs	Rags	2	Sm. Pre	—	32-32	—	Signs	—	Ex. Duct		
5 cans	Glue	Respirator Filter		—	32-20	5 cans	Glue	—	94-18		
3 rolls	Tapes	10	Comfo	—	32-21	—	Paint	—	Fab. Glass		
2 1/2 cs	Suits	6	PAPR	—	Gloves	—	Pins	—	Sm. Tubes		
2 1/2 gal	32-32	1/2 roll	Rewet	—	L. Bulbs	3 pcs	Suits	—	Varsol		
6 1/2 gal	32-21			—	N.A. Filters	—	91 Bags				
1 pint	Surfactant			—	Lrg. Box	—	82 Bags				
8	L. Bulbs			—	Lrg. Pre	—	W. Brush				
5 lbs	Nails			—	Sm. Box	—	Surfac.				
1/2 roll	Ribbon			—	Sm. Pre	—	G. Bags				
1	Signs			4 pcs	Bags	—	Mop Heads				
1	Mophead			—	Propane	—	P. Brushes				

TIME OF DELIVERY 8:00 DISTANCE FROM WHSE:

EQUIPMENT ON PROJECT

ITEM	QTY.	I.D. NO.	ITEM	QTY.	I.D. NO.	MISC.
3 Stage	1	Wooa	Mop Sets	1		
Air Pump	—		Buckets	2		
91 Vac.	1		Ext. Cord	4		
82 Vac.	—		Drop Light	1		
33 Vac.	1	Challenger	Hand Sprayer	3		
N.A. Unit	2	Air #531 macro #17	Shovel	1		
Shower	—		Ex. duct	10'		
Jackers	3	3'	OWNER'S OR REPRESENTATIVE'S SIGNATURE:			
Airless Sprayers	—		FOREMAN'S SIGNATURE:		Ronald G. Tubongbanua	
Scaffolding	—					
Generators	—					

WORK PERFORMED TODAY

DEFINED WORK AREAS: Boiler Room

SPECIFIC WORK PERFORMED: Loaded Materials and equipments on Marcor truck at Sinclair Lane Elementary sch. and unloading them at Mt. Washington Elementary school. Set up plastic barrier for enclosed work area.

AIR MONITORING COMPANY: Aerosol Monitoring and Analysis Inc.

QTY REMOVED: —

GENERAL COMMENTS: 7:00 A.M — We were at Sinclair Lane Elementary school to ladde up our Materials and equipments on Marcor. At 7:30 We left there for Mt. Washington Elementary school and got there at 8:00. After we unloaded our Materials and equipments Dave Purdum showed me the work area and told me what needs to done. At 8:30 We started setting up plastic for an enclosed work area. During Lunchbreak Dave Purdum stopped by the jobsite again to deliver the jr N.A unit he took from Sinclair lane Elem. school. At 1:30 j have Khiamoune and Bop Hewang start building the wooden airlock. At 2:30 Denise Callahan of A.M.A came and ran a preliminary air sample. They got the airlock done by 3:30 and about 70% of the enclosure.

SPECIAL NOTES, VISITORS TO SITE, & MISCELLANEOUS

AMOUNT OF DISPOSAL: —

ASBESTOS IN WORK AREA NOT PART OF SCOPE: ☐ YES ☒ NO

ASBESTOS HANDLED BY OTHERS: ☐ YES ☒ NO

IF YES, FILL OUT FORM

VISITORS TO SITE: Dave Purdum
Denise Callahan of A.M.A To run a preliminary air sample.

DELAY: ☐ YES ☒ NO BY WHOM:

MAN HOURS LOST: —

REASON FOR DELAY: —

AIR SAMPLING INFORMATION

SAMPLE TYPE	QUANT.	SAMPLE NO.	RESULT
PRELIM.	A.M.A		
I.W.A.	N.A		
O.W.A.	N.A		
PERSONAL	N.A		
FINAL	N.A		

PRESSURE DIFFERENTIAL READING: N.A

SPECIAL NOTES:

T & M

CONTRACT

DAILY JOB REPORT

Page 1 of 1

JOB NUMBER BA 7 895 DAY Monday DATE 6-13-88

JOB NAME Mt. Washington Elem. Sch. ADDRESS 1801 Sulgrave Ave. FOREMAN R. Tubongbanua

EMPLOYEE	START	STOP	HRS.	EMPLOYEE SIGNATURE
Ronald G. Tubongbanua	7:00	3:30	8	Ronald G. Tubongbanua
Bon Hevang Souvannavong	7:00	3:30	8	Souvang D-H
Khamoune Maniphone	7:00	3:30	8	Khamoune
AIR TECH NAME: Denise Callahan	7:00	3:30	8	AIR TECH SIGNATURE:

MATERIAL RECEIVED/USED

QTY.	RECEIVED	QTY.	RECEIVED	QTY.	USED	QTY.	USED	QTY.	USED	QTY.	USED
1 cs	suits			1/2 roll	Poly	5 lbs	Rags	—	Towels		
1250	Staples			2	Cassettes	—	Comfo Fil.	—	Stickers		
				—	Drums	—	Papr Fil.	—	Ribbon		
				6 roll	Tape	12 Sq'	Rewet.	2	Scrapers		
				1 gal	32-32	—	Signs	10'	Ex. Duct		
				—	32-20	2 cans	Glue	—	84-18		
				1 gal	32-21	—	Paint	—	Fab./Glass		
				—	Gloves	—	Pins	—	Sm. Tubes		
				—	L. Bulbs	12 pcs	Suits	—	Varsol		
				—	N.A. Fillers	—	81 Bags				
				1	Lrg. Box	—	82 Bags				
				1	Lrg. Pre	2	W Brush				
				—	Sm. Box	—	Surfac.				
				—	Sm. Pre	—	G. Bags				
				70 pcs	Bags	—	Mop Heads				
					Propane	2	P. Brushes				

TIME OF DELIVERY 9:15 A.M DISTANCE FROM WHSE:

EQUIPMENT ON PROJECT

ITEM	QTY.	I.D. NO.	ITEM	QTY.	I.D. NO.	MISC.
3 Stage	1	Wood	Mop Sets	1	Shovel 1	
Air Pump	—		Buckets	2	ex. duct	
81 Vac.	1	#	Ext. Cord	4	Hand saw 1	
82 Vac.	—		Drop light	1	Hand Sprayer 1	
83 Vac.	1	challenger # 23	Hose	1		
N.A. Unit	2	jr # 53 Quad # 17	nozzle	1		
Shower	—		Staple Gun	1		
Ladders	3	8'	OWNER'S OR REPRESENTATIVE'S SIGNATURE:			
Airless Sprayers	—		FOREMAN'S SIGNATURE: Ronald G. Tubongbanua			
Scaffolding	—					
Generators	—					

WORK PERFORMED TODAY

DESCRIPTION OF JOB: Boiler Room

SPECIFIC WORK PERFORMED: Finished enclosing the work area, Removed breaching and ACM pipe covering, scraped and wire brushed, clean the entire work area, patch and repair, painted 32-32 and sprayed 32-21.

AIR MONITORING COMPANY: Aerosol Monitoring and Analysis Inc.

QTY. REMOVED: About 40 linear ft of ACM pipe covering and breaching on 2 fan housing.

GENERAL COMMENTS: 7:00 A.M - We finished enclosing the work area. At 9:30 Denise Callahan of A.M.A checked our enclosure. At 10:00 We started the removal of breaching and ACM pipe covering. At 11:30 removal was done then we dowble bagged and clean the floor. After lunch We start scraping and wire brush. To the pipes that was in the work area but not being remove we patch and repair by applying rewettable and painted 32.32. We then washed down the entire work area and painted 32-32 on the elbows and the fan housing. At 2:00 Scott Hartman came by at the jobsite. At 2:30 Denise Callah went in the work area and did a visual inspection. After that we sprayed 32-21. At 3:00 Denise ran a final air sample and we left the jobsite at 3:0

SPECIAL NOTES, VISITORS TO SITE, & MISCELLANEOUS

AMOUNT OF DISPOSAL: 30 bags out of work area

ASBESTOS IN WORK AREA NOT PART OF SCOPE: ☐ YES ☒ NO

ASBESTOS HANDLED BY OTHERS: ☐ YES ☒ NO

IF YES, FILL OUT FORM

AIR SAMPLING INFORMATION

SAMPLE TYPE	QUANT.	SAMPLE NO.	RESULT
PRELIM.	—	A.M.A	
I.W.A.		A.M.A	
C.W.A.		A.M.A	
PERSONAL		Marcor	
FINAL		A.M.A	

PRESSURE DIFFERENTIAL READING: N.A

SPECIAL NOTES: —

VISITORS TO SITE: Dave Purdum, Denise Callahan, Scott Hartman

DELAY: ☐ YES ☒ NO BY WHOM:

MAN HOURS LOST: —

REASON FOR DELAY: —

☑ T & M ·

☐ CONTRACT

DAILY JOB REPORT

Page 1 of 1

JOB NUMBER BA 7 895 DAY Tuesday DATE 6-14-88

JOB NAME Mt. Washington Elem. Sch ADDRESS 1801 Sulgrave Ave FOREMAN R. Tubongbanua

EMPLOYEE	START	STOP	HRS.	EMPLOYEE SIGNATURE
Ronald G. Tubongbanua	7:00	12:00	5	Ronald G. Tubongbanua
Bon Heang Souvannavong	7:00	12:00	5	Bon Heang R.H.
Khamoune Maniphone	7:00	12:00	5	Khamoune

AIR TECH NAME: N.A AIR TECH SIGNATURE: N.A

MATERIAL RECEIVED/USED

QTY.	RECEIVED	QTY.	RECEIVED	QTY.	USED	QTY.	USED	QTY.	USED	QTY.	USED
				—	Poly	2 lbs	Rags	—	Towels		
				—	Cassettes	—	Comfo Fil.	—	Stickers		
				—	Drums	—	Papr Fil.	—	Ribbon		
				1 roll	Tape	12 sqft	Rewet.	—	Scrapers		
				—	32-32	—	Signs	—	Ex. Duct		
				—	32-20	1 can	Glue	—	84-18		
				—	32-21	—	Paint	—	Fab. Glass		
				—	Gloves	—	Pins	—	Sm. Tubes		
				—	L. Bulbs	—	Suits	—	Varsol		
				—	N.A. Filters	—	81 Bags	100	Staples		
				—	Lrg. Box	—	82 Bags				
				—	Lrg. Pre	—	W. Brush				
				—	Sm. Box	—	Surfac.				
				—	Sm. Pre	—	G. Bags				
				30 pcs	Bags	—	Mop Heads				
				—	Propane	—	P. Brushes				

TIME OF DELIVERY DISTANCE FROM WHSE:

EQUIPMENT ON PROJECT

ITEM	QTY.	I.D. NO.	ITEM	QTY.	I.D. NO.	MISC.
3 Stage						
Air Pump						
31 Vac.		Pull OUT	OF JOB			
32 Vac.						
33 Vac.						
N.A. Unit						
Shower						
Ladders			OWNER'S OR REPRESENTATIVE'S SIGNATURE:			
Airless Sprayers			FOREMAN'S SIGNATURE: Ronald G. Tubongbanua			
Scaffolding						
Generators						

WORK PERFORMED TODAY

DEFINED WORK AREAS: Boiler Room.

SPECIFIC WORKS PERFORMED: Tear down the plastic barrier, did patch and repair work underneath the duct outside of work area and loading bags materials and equipments on Marcor truck.

AIR MONITORING COMPANY: N.A

QTY REMOVED: —

GENERAL COMMENTS: 7:00 A.M - We started tearing down the plastic barrier. Denise Callahan of A.M.A left a note for me on the airlock stating that the final air sample was less than 0.01 f/cc and that area is clear. We then washed down the floor. At 10:00 A.M We did a patch and repair work underneath a duct of about 12 Sq ft by applying renettable and painting it with 32-32. At 12:00 Marcor truck came and we loaded our materials, equipments and disposable bags.

SPECIAL NOTES, VISITORS TO SITE, & MISCELLANEOUS

AMOUNT OF DISPOSAL: 46 bags on Marcor truck

ASBESTOS IN WORK AREA NOT PART OF SCOPE: ☐ YES ☒ NO

ASBESTOS HANDLED BY OTHERS: ☐ YES ☒ NO

IF YES, FILL OUT FORM

VISITORS TO SITE: Dave Purdum

AIR SAMPLING INFORMATION

SAMPLE TYPE	QUANT.	SAMPLE NO.	RESULT
PRELIM.			
I.W.A.	N.A		
O.W.A.			
PERSONAL			
FINAL			N.A

PRESSURE DIFFERENTIAL READING:

SPECIAL NOTES:

DELAY: ☐ YES ☒ NO BY WHOM:

MAN HOURS LOST: —

REASON FOR DELAY: —

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. MD-1[illegible]
Manifest Document No.
2. Page 1 of 1
Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
MARCOR OF MARYLAND
P.O. Box 1043, Hunt Valley, Md. 21030
4. Generator's Phone ( )

A. State Manifest Document Number
B. State Generator's ID

5. Transporter 1 Company Name
UNITED CONTRACTORS, INC.
6. US EPA ID Number
C. State Transporter's ID
D. Transporter's Phone

7. Transporter 2 Company Name
8. US EPA ID Number
E. State Transporter's ID
F. Transporter's Phone

9. Designated Facility Name and Site Address
S & S Landfill
19 South, N. Milford, MA
10. US EPA ID Number
G. State Facility's ID
H. Facility's Phone

	11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number) HM		12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a.	~~School 22~~	BA7-390	~~51~~	~~bags~~			
	Sinclair Elem	BA7-393	8	bags			
	Marcor Warehouse	BA80100	1	bag			
	~~Patterson Pk Lee Mink~~	~~BA7-394~~	~~12~~	~~bags~~			
b.	Mt. Wash. Elem.	BA7-395	46	bags			
	W. R. Grace	BA8-096	5	bags			
	~~Marcor Warehouse~~	~~BA8-100~~	~~1~~	~~bag~~			
c.	Leith Walk Sch	BA7-901	56	bags			
	School 149	BA7-399	1	bags			
	~~Patterson Pk Lee~~	~~BA7-396~~	~~1~~	~~bags~~			
d.	Northwood Elem	Ba7-394	16	bags			
	C & P Mechancial Decon	BA8-098	3	bags			

J. Additional Descriptions for Materials Listed Above

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. GENERATOR'S CERTIFICATION: ~~I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.~~

Printed/Typed Name | Signature | Month 10 | Day 1 | Year 88

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Month | Day | Year

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Month | Day | Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name | Signature Mark Riley | Month 11 | Day 5 | Year 88

GENERATOR — TRANSPORTER — FACILITY

ORIGINAL - RETURN TO GENERATOR

STATE OF MARYLAND
DEPARTMENT OF THE ENVIRONMENT
Martin W. Walsh, Jr., Secretary

Air Management Administration

LICENSE FOR ASBESTOS REMOVAL/ENCAPSULATION

License Number: 21-03-005 Expiration Date: June 29, 1989 Control Number: 880630986

This License is issued in accordance with and subject to the provisions of Environment Article, §6-401 et. seq., of the Maryland Code and COMAR 10.18.23. As amended through February 4, 1987.

LICENSE HOLDER

Marcor of Maryland, Inc.
P.O. Box 1043
Hunt Valley, Maryland 21030

"Interim storage authorized in accordance with COMAR 10.18.23.08C. Location: 246 Cockeysville Road."

George P. Ferreri

George P. Ferreri, Director

Issue Date: June 30, 1988

DENV 143

AMA of Maryland, Inc.

P.O. Box 917
Hunt Valley, MD 21030
301-785-5615

Environmental
Consultants

June 29, 1988

MARCOR OF MARYLAND, INC.
P. O. Box 1043
Hunt Valley, Maryland 21030

Attn: Mr. Ron Gaynor

RE: Asbestos Abatement Monitoring, Mt. Washington Elementary School

Dear Mr. Gaynor:

Enclosed please find Air Certificates of Analysis and Field Documentation Sheets for the air monitoring conducted at Mt. Washington Elementary School, Baltimore, Maryland, on June 10 and 13, 1988.

The abatement project consisted of the removal of asbestos-containing insulation from the boiler area of the school. Scheduled maintenance activity in this area would disturb insulation on breeching and associated pipework extending from boilers 1 and 2, therefore, it would be removed.

A preliminary air sample was collected in the work area on June 10, 1988 and the result was <0.01 f/cc fibers per cubic centimeter. On the morning of June 13, AMA of Maryland returned to conduct sampling on the interior and exterior of the work area throughout the removal procedure.

(Cont.)

All work was conducted in an orderly fashion, with all area samples revealing acceptable fiber concentrations. At the completion of removal and clean-up activity, a visual inspection of the area was performed and no visible debris was observed. Final sample #18506135 was run for a total volume of 486 liters.

The sample was analyzed by a NIOSH trained microscopist following the NIOSH Method 7400. The result revealed <0.01 fibers per cubic centimeter, which is the standard used by your firm. This level is ten times more stringent than the level required by the Maryland Department of the Environment. Consequently, the area was released.

Should you, have any questions or need any additional information regarding this report, please feel free to contact our office at (301) 785-5615. Thank you for using AMA of Maryland, Inc. for your environmental needs.

Very truly yours,

AMA of Maryland, Inc.

Denise Callahan

Denise Callahan
Industrial Hygiene Associate

DC/sm

Encl.

AMA of Maryland, Inc.

Environmental Consultants

CERTIFICATE OF ANALYSIS

To: MARCOR OF MARYLAND
246 Cockeysville Road
Cockeysville, MD 21030

Date: 06/17/88
Project No.: 88185
Submitted by: Denise Callahan
Sample: Airborne Fibers
Blank Submitted: ___ yes X no
Collected by AMA: X yes ___ no

SAMPLE DATE	LAB NO.	SAMPLE NUMBER	VOLUME SAMPLED	FIBERS/cc	SAMPLE TYPE & LOCATION
06/10/88	881558	18506101	482L	<0.010*	Ambient: inside work area, boiler area, basement level, 5' E. of air compressor #2, 15' from N. wall, 10' from E wall, 60" in height
06/13/88	881559	18506131	0L	<******	VOID: due to excess particulate
06/13/88	881560	18506132	2112L	<0.005*	Area: outside work area, boiler room, 3' from N. wall, 12' from W. wall, 60" in height
06/13/88	881561	18506133	1242L	<0.005*	Area: inside work area. boiler room located between boiler 1 & 2, 12' from N. wall & midway between E. & W. walls, 60" in height
06/13/88	881562	18506134	1408L	<0.005*	Area: outside work area, boiler room, 3' from N. wall, 12' from W. wall, 60" in height

AMA of Maryland, Inc.

Environmental Consultants

CERTIFICATE OF ANALYSIS

To: MARCOR OF MARYLAND
246 Cockeysville Road
Cockeysville, MD 21030

Date: 06/17/88
Project No.: 88185
Submitted by: Denise Callahan
Sample: Airborne fibers
Blank Submitted: ____ yes X no
Collected by AMA: X yes ____ no

SAMPLE DATE	LAB NO.	SAMPLE NUMBER	VOLUME SAMPLED	FIBERS/cc	SAMPLE TYPE & LOCATION
06/10/88	881558	18506101	482L	<0.010*	Ambient: inside work area, boiler area, basement level, 5' E. of air compressor #2, 15' from N. wall, 10' from E wall, 60" in height
06/13/88	881559	18506131	0L	<******	VOID: due to excess particulate
06/13/88	881560	18506132	2112L	<0.005*	Area: outside work area, boiler room, 3' from N. wall, 12' from W. wall, 60" in height
06/13/88	881561	18506133	1242L	<0.005*	Area: inside work area. boiler room located between boiler 1 & 2, 12' from N. wall & midway between E. & W. walls, 60" in height
06/13/88	881562	18506134	1408L	<0.005*	Area: outside work area, boiler room, 3' from N. wall, 12' from W. wall, 60" in height

AMA of Maryland, Inc.

Environmental Consultants

CERTIFICATE OF ANALYSIS

To: MARCOR OF MARYLAND
246 Cockeysville Road
Cockeysville, MD 21030

Date: 06/17/88
Project No.: 88185
Submitted by: Denise Callahan
Sample: Airborne fibers
Blank Submitted: ____ yes X no
Collected by AMA: ____ yes ____ no

SAMPLE DATE	LAB NO.	SAMPLE NUMBER	VOLUME SAMPLED	FIBERS/cc	SAMPLE TYPE & LOCATION
06/13/88	881563	18506135	486L	<0.010*	Final: inside work area, boiler room located between boilers 1 & 2, 12' from N. wall & centrally located between E. & W. walls, 60" in ht.

METHOD OF ANALYSIS: Fiber counts were determined by methods described in NIOSH Analytical Method 7400, 'Asbestos Fibers in Air'.

Denise Callahan

Denise Callahan
Aerosol Monitoring & Analysis, Inc.

AMA of Maryland, Inc.

Environmental Consultants

CERTIFICATE OF ANALYSIS

To: MARCOR OF MARYLAND
246 Cockeysville Road
Cockeysville, MD 21030

Date: 06/17/88
Project No.: 88185
Submitted by: Denise Callahan
Sample: Airborne fibers
Blank Submitted: ____ yes X no
Collected by AMA: ____ yes ____ no

SAMPLE DATE	LAB NO.	SAMPLE NUMBER	VOLUME SAMPLED	FIBERS/cc	SAMPLE TYPE & LOCATION
06/13/88	881563	18506135	486L	<0.010*	Final: inside work area, boiler room located between boilers 1 & 2, 12' from N. wall & centrally located between E. & W. walls, 60" in ht.

METHOD OF ANALYSIS: Fiber counts were determined by methods described in NIOSH Analytical Method 7400, 'Asbestos Fibers in Air'.

Denise Callahan

Denise Callahan
Aerosol Monitoring & Analysis, Inc.

Aerosol Monitoring & Analysis, Inc.

An AIHA Accredited Laboratory

AIR MONITORING DATA SHEET

PROJECT: MT. WASHINGTON E.S.

ADDRESS: 1501 SYCAMORE AVE.

DATE: 6/10/88

ACTIVITY: COLLECTION OF PRE SAMPLE

JOB #: 88-155

WORK ORDER #:

SAMPLED FOR: METHOD ☒ 7400 ☐ TEM CASSETTE ☒ 25mm ☐ 37mm FILTER ☒ MCE ☐ PC

- ☒ Asbestos:
- ☐ Airborne Dust
- ☐ Gas
- ☐ Vapor
- ☐ Other

Analytical Method _____ Ambient Temp. _____

Protection Worn During Sampling:

- ☐ Full Body Coveralls
- ☐ Respirator-Air Purifying
- ☐ Respirator-Power Air Purifying
- ☐ Respirator-Supplied Air

PERSONAL SAMPLING DATA

Employee Sampled

Social Security No.

Smoker: ☐ Yes ☐ No

Job Function

Description of Activity:

Signature of Employee:

LAB ID	SAMPLE NO.	SAMPLE DATE	SAMPLE LOCATION
	155-01	6/10/88	BOILER AREA, BASEMENT LEVEL 5' EAST OF AIR COMPRESSOR #2, 15' FROM N WALL, 10' FROM E WALL. 60" AFF

FIELD SAMPLE NO.	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING START (LITTERS/MIN.)	FLOW RATE SETTING STOP (LITTERS/MIN.)	INSTRUMENT SERIAL NO.	SAMPLE TYPE AMBIENT	SAMPLE TYPE AREA	SAMPLE TYPE PERSONAL	SAMPLE TYPE FINAL	SAMPLE LOCATION IN WORK AREA	SAMPLE LOCATION OUTSIDE WORK AREA	SAMPLE LOCATION N/A
6101	1445	1530	45	10.7	10.7	B-10	✓				✓		

Received By Lab:

Received By Analyst:

Analysis Complete:

Inspector: DENNIS CALLAHAN (Print)

Dennis Callahan (Signature)

Date: 6/10/88

Aerosol Monitoring & Analysis, Inc.

An AIHA Accredited Laboratory

AIR MONITORING DATA SHEET

PROJECT: MT. WASHINGTON E.S.

ADDRESS: 1801 SILVERAVE AVE

DATE: 6/13/88

ACTIVITY: REMOVAL OF ACM BREECHING/PIPES FROM BOILER

JOB #: 88-105

WORK ORDER #:

SAMPLED FOR: METHOD ☒PCM ☐TEM CASSETTE ☐25mm ☐37mm FILTER ☒MCE ☐PC

☒ Asbestos:
☐ Airborne Dust
☐ Gas
☐ Vapor
☐ Other
Analytical Method ____ Ambient Temp. ____

Protection Worn During Sampling: (Inside enclosure)

☒ Full Body Coveralls
☒ Respirator-Air Purifying Comfo II
☐ Respirator-Power Air Purifying
☐ Respirator-Supplied Air

PERSONAL SAMPLING DATA

Employee Sampled
Social Security No.
Smoker: ☐ Yes ☐ No
Job Function
Description of Activity:
Signature of Employee:

LAB ID	SAMPLE NO.	SAMPLE DATE	SAMPLE LOCATION
	18506131	6/13/88	BOILER ROOM, LOCATED BETW BOILER #2. 12' FROM NORTH WALL AND MIDWAY BETW. E+W WALLS. 60" AFF.
	18506132	6/13/88	BOILER ROOM, 3' FROM NORTH WALL, 12' FROM WEST WALL, 60" AFF.
	18506133	6/13/88	Same as # 18506131
	18506134	6/13/88	Same as # 18506132

FIELD SAMPLE NO.	TEST PERIOD START	STOP	TOTAL (MIN.)	FLOW RATE SETTING START (LITTERS/MIN.)	STOP	INSTRUMENT SERIAL NO.	SAMPLE TYPE AMBIENT	AREA	PERSONAL	FINAL	SAMPLE LOCATION IN WORK AREA	OUTSIDE WORK AREA	N/A
06131	1015	1300	165	10.5	10.5	R1		✓			✓		
06132	1015	1300	165	12.7	12.7	88-02		✓				✓	
06133	1305	1500	115	10.8	10.8	R1		✓			✓		
06134	1310	1500	110	12.8	12.8	88-02		✓				✓	

Received By Lab:

Received By Analyst:

Analysis Complete:

Inspector: DENISE CALLAHAN (Print)

Denise Callahan (Signature)

Date: 6/13/88

Aerosol Monitoring & Analysis, Inc.

An AIHA Accredited Laboratory

AIR MONITORING DATA SHEET

PROJECT: MT. WASHINGTON ES

ADDRESS: 1501 JULGRAVE AVE

DATE: 6/13/88

ACTIVITY: REMOVAL OF ACM BREECHING, PIPEWORK

JOB #: 88-155

WORK ORDER #:

SAMPLED FOR: METHOD ☑ 7400 ☐ TEM; CASSETTE ☐ 25mm ☐ 37mm; FILTER ☐ MCE ☐ PC

- ☐ Asbestos:
- ☐ Airborne Dust
- ☐ Gas
- ☐ Vapor
- ☐ Other

Analytical Method _____ Ambient Temp. _____

Protection Worn During Sampling:

- ☐ Full Body Coveralls
- ☐ Respirator-Air Purifying Comfo II
- ☐ Respirator-Power Air Purifying
- ☐ Respirator-Supplied Air

PERSONAL SAMPLING DATA

Employee Sampled

Social Security No.

Smoker: ☐ Yes ☐ No

Job Function

Description of Activity:

Signature of Employee:

LAB ID	SAMPLE NO.	SAMPLE DATE	SAMPLE LOCATION
	155061355	6/13/88	BOILER ROOM, LOCATED BETW. BOILERS 1 & 2, 12' FROM N WALL AND CENTRALLY LOCATED BETW. E & W WALL 60' AT.

FIELD SAMPLE NO.	TEST PERIOD START	STOP	TOTAL (MIN.)	FLOW RATE SETTING (LITTERS/MIN.) START	STOP	INSTRUMENT SERIAL NO.	SAMPLE TYPE AMBIENT	AREA	PERSONAL	FINAL	SAMPLE LOCATION IN WORK AREA	OUTSIDE WORK AREA	N/A
155061355	1500	1545	45	10.8	10.3	L1				✓	✓		

Received By Lab:

Received By Analyst:

Analysis Complete:

Inspector: DENISE CALLAHAN (Print)

Denise Callah (Signature)

Date: 6/13/88

88-195

Aerosol Monitoring & Analysis, Inc.

An AIHA Accredited Laboratory

DATE: 6/10/88 **CONSULTANT:** DENISE CALLAHAN

SITE: MT. WASHINGTON ELEMENTARY **TITLE:** INDUSTRIAL HYGIENE ASS.
1801 SULGRAVE AVE.
BALTIMORE, MD 21209 MARLOR FOREMAN: RON

PURPOSE OF VISIT:

COLLECT PRELIMINARY AIR SAMPLE WITHIN THE WORK AREA.

GENERAL OBSERVATIONS:

2:30 pm — ARRIVED ON-SITE AND MET W/ RON, FOREMAN FOR MARLOR. GIVEN WORK DETAIL, WHICH INCLUDED BREECHING + PIPE INSULATION TO BE REMOVED ON 6/13/88.

2:45 pm — SET UP PUMP W/ SAMPLE # A5506-101 TO RUN.

3:30 pm — SAMPLE IS COMPLETE, SHUT PUMP OFF & LEAVE SITE.

Aerosol Monitoring & Analysis, Inc.
An AIHA Accredited Laboratory

DATE: 6/13/88 **CONSULTANT:** DENISE CALLAHAN

SITE: MT. WASHINGTON E.S.
1801 SULGRAVE AVE.
BALTIMORE, MARYLAND
21209

TITLE: INDUSTRIAL HYGIENE ASSOCIATE

FOREMAN: RON TUBANGUANA

PURPOSE OF VISIT:
PRE-ABATEMENT CHECK, ALONG WITH CONTINUOUS AIR-MONITORING THROUGHOUT ABATEMENT ACTIVITY.

GENERAL OBSERVATIONS:

7:15 AM — ARRIVED ON-SITE AND MET W/ RON OF MARCOR. A ROOF STILL HAS TO BE BUILT ON THE BARRIER - SAID THEY SHOULD BE READY AROUND BREAK TIME.

8:05 AM — DAVE PURDUM (ASSISTANT SUPER.) ARRIVED TO BRING SOME SUPPLIES AND TO CHECK ON THINGS. INFORMED ME TO RUN AN OUTSIDE AND INSIDE THE AREA SAMPLE THROUGHOUT REMOVAL.

@ 8:30 AM - DAVE LEFT, SET-UP CONTINUES.

10:00-10:12 AM — VISUAL INSPECTION OF AREA. EVERYTHING IN ORDER, PROPER SIGNAGE AT ENTRANCE, GOOD NEGATIVE PRESSURE, ETC.. WORK BEGINS, PUMPS TURNED ON AT 10:15 AM. SAMPLES = 18506131 & = 18506132, INSIDE & OUTSIDE THE AREA.

1:00 PM — CHANGED CASSETTES, STARTED SAMPLES = 18506103 + 18506104.

DATE: 6/13/98 PAGE: 2 of 2

GENERAL OBSERVATIONS CONTINUED:

3:00 pm - VISUAL INSPECTION REVEALS AREA TO BE CLEAN, NO VISUAL DEBRIS IS OBSERVED. SHUT DOWN PUMPS BEGIN TO RUN SAMPLE # 18506135 (FINAL) W/IN THE AREA.

3:45 pm - SAMPLE IS COMPLETE, READY FOR ON-SITE ANALYSIS.

4:05 pm - ANALYSIS REVEALS A FIBER CONCENTRATION OF <0.01 f/cc. SITE IS RELEASED. LEFT MESSAGE FOR RON IN AREA. COLLECTED EQUIP. + LEFT SITE.

Aerosol Monitoring & Analysis, Inc.

An AIHA Accredited Laboratory

PRE-ABATEMENT CHECK LIST

Building MT. WASHINGTON ELEMENTARY SCHOOL Date 6/12/98

Location BOILER ROOM, SOUTH SIDE OF BOILERS #1 & 2

Project Description REMOVAL OF ASBESTOS INSULATION FROM BREECHING & ASSOCIATED PIPEWORK/FITTINGS OF BOILERS.

Company Performing Abatement MARCOR OF MD., INC.

Supervisor on Job RON T Title FORMAN (TRAINING)

Performance Specification Prepared By CITY

Final Cleanliness Specification <0.01 Prepared by BALT. CITY

	Acceptable	Not Applicable	Problems Encountered/Comments
Work-Site Preparation			
A. Area non-accessible to general public	☑	☐	
B. Signage			
1. Proper caution signs at entrances and exits	☑	☐	
2. Dumpster Labeled	☐	☐	
C. Airlock-Decontamination Area			
1. Clean Room - 1st Stage			
a. Lockers/clothing storage provided	☑	☐	
b. Double plastic flaps at entrance and exit	☑	☐	
2. Shower Area - 2nd Stage			
a. Showers operating	☐	☑	NO WATER SOURCE USE OF BUCKET INSTEAD.
b. Shower waste water properly filtered	☐	☑	
c. Double plastic flaps at entrance and exit	☐	☑	
d. Clean towels available	☐	☑	
3. Equipment Room - 3rd Stage			
a. Double plastic flaps at entrance and exit	☑	☐	
b. Labeled bag for disposal of used suits	☑	☐	
D. Perimeter Barrier Preparation			
1. 6 mil plastic used	☑	☐	
2. Floor plastic (2 layers)	☑	☐	
3. Wall plastic	☑	☐	
4. Proper sealing of:			
a. Doors	☐	☑	
b. Windows	☐	☑	
c. Ventilation Systems	☐	☑	
1. Vents	☑	☑	
2. Ducts	☑	☐	
3. Grilles	☑	☐	
4. System turned off	☑	☐	
d. Pipes and conduit	☑	☐	
e. Light Fixtures	☑	☐	
f. Sprinkler heads	☐	☑	
g. All other openings into work area	☑	☐	
5. Penetrations through ceiling properly sealed	☑	☐	

(complete page two)

PRE-ABATEMENT CHECK LIST

Date 6/13/88

E. Abatement Equipment

1. H.E.P.A. Filtered Vacuums
   a. Number of units 2
   b. Type NILFISK / HYDRO-VAC
2. H.E.P.A. Ventilation Units
   a. Number of units 1
   b. Type CRITKAL SYSTEMS
   c. Operating ☑ yes ☐ no
   d. H.E.P.A. filters present ☑ yes ☐ no
   e. Exhausted out of work area ☑ yes ☐ no
   f. Negative pressure inside work area:

Measurements	Inches H_2O	Location
1		5' U of western most boiler,
2		6' below S wall.
3		

3. Water hoses present ☑ yes ☐ no
4. Amended water sprayers present ☑ yes ☐ no
5. Surfactant present ☑ yes ☐ no
6. Type of encapsulant to be used 32-32
7. Any other equipment to be used

F. Worker Protection

1. Respiratory Protection
   a. Type of respirators to be used PAPR's / CAMFOS (Cyn 22Y-4P)
   b. Are respirators NIOSH/MSHA approved? ☑ yes ☐ no
2. If jurisdiction requires licensing, do all workers have proper identification to perform asbestos removal? ☑ yes ☐ no
3. Proper Protective Clothing
   Full body coveralls ☑ Hard Hats ☐
   Head covers ☑ Eye protection ☐
   Foot covers ☑ ☐
4. Proper area for changing, eating, resting? ☑ yes ☐ no

G. Verification of Waste Disposal Site ☐ yes ☐ no

Name and Location

H. Authorization to Proceed:

Date 6/13/88 Time 10:12 AM
Inspector DENISE CALLAHAN Signature Denise Callahan
Title INDUSTRIAL HYGIENE ASSOCIATE
Authorization given to RON T.
Witness(es)

FINAL ABATEMENT CHECK LIST

Building MT. WASHINGTON ELEMENTARY SCHOOL Date 6/13/88
Location BOILER ROOM, BASEMENT LEVEL, W. SIDE OF BLDG.
Project Description REMOVAL OF ACM FROM BREECHING & ASSO. PIPEWORK/FITTINGS OF BOILERS. (PRIOR TO MAINTENANCE ACTIVITY IN ARE
Company Performing Abatement MARCOR
Inspector DENISE CALLAHAN Signature Denise Callahan
Title INDUSTRIAL HYGIENE ASSOCIATE
Accompanied by RON Title FOREMAN
Time of Inspection: Start 2:45 PM Stop 3:00 PM

A. VISUAL INSPECTION OF WORK AREA

The following areas have been wet cleaned and/or H.E.P.A. vacuumed and seen to contain no residual dust and debris:

WORK SITE INSPECTION

	Acceptable	Not Applicable	Problem Encountered/Comments
1. Floors	☑	☐	
2. Walls	☑	☐	
3. Windows ledges	☐	☑	
4. Pipes:			
a. Vertical	☑	☐	
b. Horizontal	☑	☐	
c. Pipe hangers	☑	☐	
5. Ventilation Equipment	☐	☑	
6. Ducts	☑	☐	
7. Registers	☑	☐	
8. Lights	☑	☐	
9. Conduit and wires	☑	☐	
10. Sprinkler heads	☐	☑	
11. Fire alarms	☐	☑	
12. Electrical panels & boxes.	☐	☑	
13. All other horizontal surfaces	☑	☐	
14. All other vertical surfaces	☑	☐	
15. Removal equipment remaining in work area	☑	☐	
16. Areas adjacent to work site barrier	☑	☐	

B. ENCAPSULATION

1. Has encapsulant been used? ☑ yes ☐ no
2. Name of encapsulant used 32-30

(complete page two)

FINAL ABATEMENT CHECK LIST

Date 6/13/88

C. Have all bags of removal debris been properly labeled and removed from work area? ☑yes ☐no

D. FINAL AIR SAMPLING

1. Sample I.D. number(s) 1850635
2. Were samples analyzed on site? ☑yes ☐ no
3. If yes, person performing analysis DENISE CALLAHAN Title: IHA
4. Was a blank submitted? ☐ yes ☑no
5. Is electron microscopy required? ☐ yes ☑no
6. What is the specified final clearance level? (f/cc)? <0.01
7. Were HEPA ventilation units run during the taking of final air samples? ☑yes ☐ no
8. Were any other aggressive sampling techniques used? ☐ yes ☑no

   Describe

E. RESULTS OF VISUAL INSPECTION

The work area was found to be acceptably free of residual dust and debris ☑yes ☐ no

Inspector DENISE CALLAHAN Signature Denise Callahan

Date 6/13/88 Time 3:00 PM

F. RESULTS OF AIR TEST[S]

The results of final air tests

Sample I.D.	Result (f/cc)
1850635	<0.01

Are these results below the final clearance level? ☑yes ☐ no

Has the work area been released? ☑yes ☐no

Notification give to RON V. Title: FORMAN

Date and time of notification 6/14/88 7:00 AM

Microscopist DENISE CALLAHAN Signature Denise Callahan

G. Has the contractor been informed to clean all contamination left behind barriers? ☑yes ☐no

H. Final Cleanliness Specification <0.01 fibers/cc prepared by BALTO. CITY

Has analysis of final samples met specified level of cleanliness ☑yes ☐ no

AMA JOB NUMBER: 98-185

INDUSTRIAL HYGIENE SERVICES

IPLOYEE: David Calbert

JB SITE: 111 Washington St.

DDRESS: 1901 Sullivane Ave
Balto, Md. 21209

DESCRIPTION OF WORK: Collection of
AMBIENT SAMPLE PRIOR TO
WORK

LABOR

DATE	MILEAGE PER DAY	(SPECIFY A.M. OR P.M.) TIME OF ARRIVAL	TIME OF DEPARTURE	REGULAR ON-SITE HOURS	OVERTIME ON-SITE HOURS	TRAVEL HOURS S/T	TRAVEL HOURS O/T	REGULAR OFFICE HOURS	OVERTIME OFFICE HOURS
4/10/99	12	2:30pm	3:30pm	1		.75			
TOTALS:				1		.75			

SAMPLES

DATE	# ASBESTOS AIRS	# AIRS FIELD	# ASBESTOS BULKS	# CHEMICAL SAMPLES	# TEM SAMPLES	# SEM SAMPLES	# BLANK SAMPLES
4/10/99	1						
TOTALS:							

ADDITIONAL COSTS

IBROUS AEROSOL MONITOR	# of days	X RATE		= TOTAL $
RESSURE TRANS. W/CHART	# of days	X RATE		= TOTAL $
QUIPMENT RENTAL	# of days	X RATE		= TOTAL $
RAINING - 5 hour course	# of days	X RATE		= TOTAL $
2 hour course	# of days	X RATE		= TOTAL $
OTHER TRAINING	# of days	X RATE		= TOTAL $
THER		X RATE		= TOTAL $

I verify the above to be accurate.

MA

AMA JOB NUMBER: 88-155

INDUSTRIAL HYGIENE SERVICES

EMPLOYEE: DENISE CALLAHAN

JOB SITE: MT. WASHINGTON E.S.

ADDRESS: ~~SAME~~ AME
1301 SULGRAVE
BALTO. MD. 21208

DESCRIPTION OF WORK: AIR - MONITORING THROUGHOUT ABATEMENT ACTIVITY, writing report

LABOR

DATE	MILEAGE PER DAY	(SPECIFY A.M. OR P.M.) TIME OF ARRIVAL	TIME OF DEPARTURE	REGULAR ON-SITE HOURS	OVERTIME ON-SITE HOURS	TRAVEL HOURS S/T	TRAVEL HOURS O/T	REGULAR OFFICE HOURS	OVERTIME OFFICE HOURS
6/13/88		7:15 AM	4:15 PM	8					
2/14/89								.75	
TOTALS:				8				.75	

SAMPLES

DATE	# ASBESTOS AIRS	# AIRS FIELD	# ASBESTOS BULKS	# CHEMICAL SAMPLES	# TEM SAMPLES	# SEM SAMPLES	# BLANK SAMPLES
6/13/88	5						
TOTALS:							

ADDITIONAL COSTS

FIBROUS AEROSOL MONITOR	# of days	X RATE		= TOTAL $
PRESSURE TRANS. W/CHART	# of days	X RATE		= TOTAL $
EQUIPMENT RENTAL	# of days	X RATE		= TOTAL $
TRAINING - 5 hour course	# of days	X RATE		= TOTAL $
2 hour course	# of days	X RATE		= TOTAL $
OTHER TRAINING	# of days	X RATE		= TOTAL $
OTHER		X RATE		= TOTAL $

I verify the above to be accurate.

AMA

STATE OF MARYLAND
DEPARTMENT OF THE ENVIRONMENT
Martin W. Walsh, Jr., Secretary

Air Management Administration

LICENSE FOR ASBESTOS REMOVAL/ENCAPSULATION

License Number: 21-03-005 Expiration Date: June 29, 1989 Control Number: 880630986

This License is issued in accordance with and subject to the provisions of Environment Article, §6-401 et. seq., of the Maryland Code and COMAR 10.18.23. As amended through February 4, 1987.

LICENSE HOLDER

Marcor of Maryland, Inc.
P.O. Box 1043
Hunt Valley, Maryland 21030

"Interim storage authorized in accordance with COMAR 10.18.23.08C. Location: 246 Cockeysville Road."

George P. Ferreri

George P. Ferreri, Director

Issue Date: June 30, 1988

DENV 143

Marcor of Maryland, Inc.
AHERA Trained Personnel

December, 1987

Name	Date	Cert. #	Hours	Exp. Date
Robin Balonis	12/27/87	87-1238 AMA	24	12/88
Donald E. Jackson	12/31/87		24	
Albert Kutz	12/31/87		24	
Lionel C. Porter	12/31/87		32	
Gordon P. Kelly	12/23/87	87-12-30-09E*		12/30/88
William Johnson	12/28/87	87-12-30-05E*		12/30/88
Albert Kutz	12/28/87	87-12-30-06E*		12/30/88
Donald E. Jackson	12/28/87	87-12-30-07E*		12/30/88
Ed Zambelli	12/28/87	87-12-30-10E*		12/30/88
Michael A. Ring	12/29/87	87-12-30-08E*		12/30/88
Lionel C. Porter	12/28/87	87-12-30-11E*		12/30/88

January, 1988

Name	Date	Cert. #	Hours	Exp. Date
Boualy Chandavong	1/14/88	88-040 AMA	24	1/89
Khamla Inthavone	1/14/88	88-039 AMA	24	1/89
B.H. Souvannavong	1/14/88	88-038 AMA	24	1/89
Path Keohannavong	1/21/88	88-032 AMA	24	1/89
Khamla Khantry	1/21/88	88-059 AMA	24	1/89
Gardner Parks	1/21/88	88-063 AMA	32	1/89
Lun Thock	1/21/88		24	
Quentin Batts	1/21/88	88-048 AMA	24	1/89
Pin Phuma	1/21/88	88-064 AMA	24	1/89
Saylom Sysoumphai	1/21/88	88-062 AMA	24	1/89
Michael A. Cain	1/23/88	88-095 AMA	32	1/89
Keith Johnson	1/23/88	88-089 AMA	32	1/89
Gregory L. Irwin	1/23/88	88-088 AMA	32	1/89
Rob Reisman	1/23/88	88-087 AMA	32	1/89
Edward Casey	1/23/88	88-086 AMA	32	1/89
Loeum Pho	1/21/88	88-065 AMA	24	1/89
Sum Khoen	1/21/88	88-111 AMA	24	1/89
Lun Thock	1/21/88	88-066 AMA	24	1/89

February, 1988

Name	Date	Cert. #	Hours	Exp. Date
Robert Eichner	2/19/88	88-198 AMA	32	2/89
Choi	2/18/88	88-061 AMA	24	2/89
Cha Phimphanh	2/18/88	88-207 AMA	24	2/89
C. Thongdygnalat	2/18/88	88-202 AMA	24	2/89
Leng Phay	2/16/88	88-208 AMA	24	2/89
Somsouk Phimphanh	2/16/88	88-206 AMA	24	2/89

March, 1988

Name	Date	Cert. #	Hours	Exp. Date
Frank Zambelli	3/18/88	88-271 AMA	32	3/89

April, 1988

Name	Date	Cert. #	Hours	Exp. Date
Yomi Humphrey	4/16/88	88-04-10-01E*	24	4/10/89
Richard Bennett	4/16/88	88-04-10-02E*	24	4/10/89
Brian Maddox	4/16/88	88-04-10-03E*	24	4/10/89
Michael DeVoe	4/16/88	88-04-10-04E*	24	4/10/89
Richard Krivosh	4/16/88	88-04-10-05E*	24	4/10/89
Gary Schwiegerath	4/16/88	88-04-10-06E*	24	4/10/89
James Kelbaugh	4/17/88	88-04-10-21E*	32	4/10/89
Ronald Tubongbanua	4/17/88	88-04-10-14E*	32	4/10/89
Amos Tomlin	4/17/88	88-04-10-19E*	32	4/10/89
Larry Williams	4/17/88	88-04-10-17E*	32	4/10/89
Gregory Lusk	4/17/88	88-04-10-20E*	32	4/10/89
Joseph McFadden	4/17/88	88-04-10-16E*	32	4/10/89
Noune Haneluxay	4/16/88	88-04-10-07E*	24	4/10/89
Khampha Vongphachanh	4/16/88	88-04-10-08E*	24	4/10/89
Mark Loughlin	4/16/88	88-04-10-09E*	24	4/10/89
S. Sourinhong	4/16/88	88-04-10-10E*	24	4/10/89
Khamphouri Sipayboun	4/17/88	88-04-10-15E*	32	4/10/89
Dennis Street	4/17/88	88-04-10-18E*	32	4/10/89
William Armstrong	4/16/88	88-04-10-11E*	24	4/10/89
Nadine Thorn	4/16/88	88-04-10-12E*	24	4/10/89
Sommay Sipayboun	4/16/88	88-04-10-13E*	24	4/10/89
L.W. Lucas	4/15/88	88-650 AMA	32	4/89

July, 1988

Name	Date	Cert. #	Hours	Exp. Date
Arthur Canada	7/17/88	88-961 AMA	24	7/89
My Chandavong	7/17/88	88-958 AMA	24	7/89
Walter L. Harris	7/17/88	88-964 AMA	24	7/89
Somphone Pathoumthone	7/17/88	88-960 AMA	24	7/89
Be Phoumy	7/17/88	88-954 AMA	24	7/89
Man Song	7/17/88	88-959 AMA	24	7/89
Robert Taylor	7/17/88	88-962 AMA	24	7/89
Song Yang	7/17/88	88-956 AMA	24	7/89
Fred Scott	7/17/88	88-952 AMA	32	7/89
Dave Purdum	7/17/88	88-957 AMA	32	7/89

August, 1988

Name	Date	Cert. #	Hours	Exp. Date
Michael Mote	8/14/88	88-1018 AMA	24	8/89
Khamning Phom	8/14/88	88-1028 AMA	24	8/89
Lem Phae	8/14/88	88-1027 AMA	24	8/89
Bunthoeun Mao	8/14/88	88-1024 AMA	24	8/89
Phean Thock	8/14/88	88-1023 AMA	24	8/89
Khamoune Maniphone	8/14/88	88-1020 AMA	24	8/89
Somphone Sirisouk	8/14/88	88-1015 AMA	24	8/89
Daniel Culver	8/14/88	88-1014 AMA	24	8/89
Robert Brown	8/14/88	88-1013 AMA	24	8/89
Nathaniel Woods, III	8/14/88	88-1017 AMA	24	8/89
Steve A. Wesson	8/14/88	88-1016 AMA	24	8/89
Vinai Jareunvaravuth	8/14/88	88-1021 AMA	24	8/89
Thuy Mao	8/14/88	88-1026 AMA	24	8/89
Melvin Smith	8/14/88	88-1019 AMA	24	8/89
Ronald Pugh	8/14/88	88-1012 AMA	24	8/89
Jeffrey Evans	8/14/88	88-1035 AMA	24	8/89
Ovane Rainey	8/14/88	88-1034 AMA	24	8/89
Charles Rainey	8/14/88	88-1033 AMA	24	8/89
Maurice Proctor	8/14/88	88-1031 AMA	24	8/89
Karen Farrar	8/14/88	88-1030 AMA	24	8/89

APPENDIX C

REMAINING ACM AFTER COMPLETION OF RESPONSE ACTIONS CONTAINED IN THIS APPENDIX

TABLE 1-A
ACM QUANTITIES BY APPLICATION

FOR PS[illegible]

ACM APPLICATION	QUANTITY SQUARE FEET	QUANTITY LINEAR FEET
CEILINGS & WALLS		
SPRAYED-ON		
TILE		
ACOUSTIC PLASTER		
OTHER PLASTER		
WALLBOARD		
FLOOR COVERINGS	3000	
MECHANICAL		
PIPE		2530
ELBOWS & FITTINGS	1410	
BOILERS & BREECHING	400	
TANKS	106	
DUCTWORK		
OTHER (GASKETS, FLEXIBLE CONNECTORS, ETC)		
OTHER		
CURTAINS		
FIREDOORS	126	
CEMENT BOARD		

NOTE: FOR LOCATIONS OF ACBM APPLICATIONS, SEE THE PRECEDING TEXT IN THIS SECTION (1.2) AND APPENDIX H.

Versar Inc.

APPENDIX D

SCHEDULE FOR RESPONSE ACTIONS

RESPONSE ACTION SCHEDULE

SCHOOL NAME: Mount Washington Elementary School

NUMBER: PS 221

RESPONSE ACTIONS PER FUNCTIONAL SPACE

FUNCTIONAL SPACE No.		DATE START	DATE OF COMPLETION
01		9/1/89	5/31/90
02	Restrict Access	7/1/96	7/1/97
05		9/1/89	5/31/90
06		7/1/91	7/1/92
07		7/1/91	7/1/92
08		7/1/91	7/1/92
09		7/1/91	7/1/92
10		7/1/91	7/1/92
11		9/1/89	5/31/90
12		9/1/89	5/31/90

Versar INC.

APPENDIX E

OPERATIONS AND MAINTENANCE PROCEDURES

Versar, Inc.

FLOOR TILE/SHEET FLOORING MASTIC

Floor tile, sheet flooring, and mastic often contain asbestos. The mastic found beneath the floor tile and sheet flooring is used to bond the tile and sheet flooring to the substrate. Floor tile, sheet flooring, and mastic are nonfriable in their installed state. However, if any sanding, drilling, or abrading of tile, sheet flooring, or mastic occurs, it can create friable material. When friable, disturbed tile, sheet flooring, and mastic can release fibers into the surrounding air. Several precautions must be followed to reduce potential fiber release and entrainment into the building environment.

The following methods and precautions to be followed for asbestos-containing floor tile, sheet flooring, and mastic are described below:

- Floor tile, sheet flooring, and/or mastic must not be sanded, drilled, or otherwise abraded.
- Floor tile and sheet flooring should maintain a good waxed surface to prevent potential premature wear by pedestrian traffic.
- The use of machines to strip old wax is prohibited; use floor mops or other hand methods. Do not use steel wool pads or other abrasives for polishing.
- Any spilled liquids should be promptly cleaned up to avoid water damage that may cause delamination of tile from its substrate.
- Removal of floor tile, sheet flooring, and mastic should never take place, regardless of quantity, unless the Designated LEA Representative is notified. This individual will assist the school in the proper removal of the tile, sheet flooring, and mastic.

Versar Inc.

PIPE INSULATION

Pipe insulation found within a school can be a significant source of airborne asbestos fibers. Asbestos-containing pipe insulation is usually found in one of two forms. A block preformed type, usually white in color, tends to be the most friable if disturbed. The second type is corrugated paper, which has individual air pockets inside the cardboard layers. Both types have basically the same use. The insulation reduces the transfer of heat between the pipe contents and the surroundings. Some pipe insulation is also used to minimize "sweating" of piping systems. Through maintenance activities, workers in the building can come in contact with these materials. All employees should be apprised as to the locations within their work areas of piping insulated with ACM.

The following operations and maintenance procedures are to be followed related to asbestos-containing pipe insulation:

- Do not make any repairs or alterations to ACM insulated pipe. If repairs or alterations need to be done, contact the Designated LEA Representative, who will provide assistance in the removal and replacement of the insulation as required.
- Report any new damage. Do not attempt to clean up loose or fallen asbestos insulation. The need for any clean-up should be reported to the Designated LEA Representative.
- During maintenance activities, avoid hitting, impacting, or any other action that might damage the insulation.
- Any system leaks or other potential sources of water should be addressed immediately to avoid possible water or steam damage to the insulation. If damage has already occurred to the insulation, do not attempt repair. Contact the Designated LEA Representative as soon as the leak is discovered. If possible, shut off the water or steam source to prevent continued leakage.
- If the insulation is covered with canvas, report any punctures to or abrasions of the canvas or paint deterioration to the Designated LEA Representative.

Versar Inc.

ELBOWS AND FITTINGS

Elbows and fittings are found throughout a school building and are associated with several systems, which may include domestic hot and cold water, heat supply and return, condensate return, or any number of others. Elbows are used when pipes make directional changes and fittings consist of valves, tees, or other mechanical junctures. These elbows and fittings are insulated with preformed block or trowelled-on or hand-packed cementious materials containing asbestos. In many applications, there is an outer wrapping of canvas which may be painted for further protection. It is important that the canvas wrap, if present, not be punctured or disturbed. All forms of fitting insulation are particularly prone to water, steam, or impact damage. Potential damage can be minimized by addressing water or steam leaks immediately and preventing impact damage by taking precautions during routine maintenance activities. All employees should be apprised as to the locations within their work areas of elbows and fittings insulated with ACM.

The following operations and maintenance procedures are to be followed related to asbestos-containing elbow and fitting insulation:

- Do not make any repairs or alterations to ACM insulated elbows or fittings. If repairs or alterations need to be done, contact the Designated LEA Representative, who will provide assistance in the removal and replacement of the insulation as required.
- Report any new damage. Do not attempt to clean up loose or fallen asbestos insulation. The need for any clean-up should be reported to the Designated LEA Representative.
- During maintenance activities, avoid hitting, impacting, or any other action that might damage the insulation.
- Any system leaks or other potential sources of water should be addressed immediately to avoid possible water or steam damage to the insulation . If damage has already occurred to the insulation, do not attempt repair. Contact the Designated LEA Representative as soon as the leak is discovered. If possible, shut off the water or steam source to prevent continued leakage.
- If the insulation is covered with canvas, report any punctures to or abrasions of the canvas or paint deterioration to the Designated LEA Representative.

Versar INC.

BOILERS, BREECHING, TANKS

Boilers, breeching, and tanks may have several layers of asbestos-containing insulating material. A block layer sometimes is found beneath a trowelled-on smooth layer. Both layers often contain asbestos. In addition, these components may have a painted canvas covering. Persons working around these components must take precautions to prevent accidental fiber release from the insulation.

The following operations and maintenance procedures are to be followed related to asbestos-containing boiler, breeching, or tank insulation:

- Avoid any drilling, replacement of insulation, cutting, fitting of new components, or sanding. Any needed repairs and/or removal must be cleared with the Designated LEA Representative prior to such activities.
- Report any new damage. Do not attempt to clean up loose or fallen asbestos insulation. The need for any clean-up should be reported to the Designated LEA Representative.
- Avoid storing, stacking, or leaning material against boilers, breeching, or tanks to prevent impact damage.
- Any system leaks or other potential sources of water should be addressed immediately to avoid water or steam damage to the insulation. If damage has already occurred to the insulation, do not attempt repair. Contact the Designated LEA Representative as soon as the leak is discovered. If possible, shut off the water or steam to prevent continued leakage.
- If the insulation is covered with canvas, report any punctures to or abrasions of the canvas or paint deterioration to the Designated LEA Representative.

Versar Inc.

FIRE DOORS

Throughout the building, fire doors are most commonly found as barriers between mechanical and boiler rooms, hallways, or to the outside. The door interior (or core) is often friable asbestos material. In its present state between a layer of wood or metal, fiber release is minimal. However, should any drilling, cutting, altering of the doors, or hardware removal take place, it could result in asbestos fibers being released into the ambient air.

The following operations and maintenance procedure are to be followed related to asbestos-containing fire doors:

- Drilling or cutting into the door is prohibited. If this type of work needs to take place, consult the Designated LEA Representative prior to such activities.
- When doors are to be replaced, they should be removed intact as per the Baltimore Specifications.
- Any work done to locks or handles should be avoided since asbestos can be exposed and damaged through this activity. Again, consult the Designated LEA Representative for guidance prior to such activities.

APPENDIX F

AHERA ACCREDITATION/REACCREDITATION CERTIFICATES

Alice Hamilton Occupational Health Center

This is to Certify that

Lawrence G. Davies

has met the Attendance Requirements

and successfully completed the Course in

Asbestos Inspector/Management Planner Refresher

Brian W. Smith

Course Director

January 20, 1989

Date

Registered Certificate

No: IMP-R-002

Expires on: January 20, 1990

21

The Georgia Institute of Technology

Larry Davies

Has attended and satisfactorily passed an examination
covering the contents of a continuing education course entitled:

"MANAGING ASBESTOS IN BUILDINGS"

020
Certificate Number

October 2, 1987
Date

Course Director

Exam Administrator

The Georgia Institute of Technology

Larry Davies

Has attended and satisfactorily passed an examination
covering the contents of a continuing education course entitled:

"INSPECTING BUILDINGS FOR ASBESTOS-CONTAINING MATERIALS"

024
Certificate Number

October 7, 1981
Date

Course Director

Exam Administrator

TUFTS UNIVERSITY

Center for Environmental Management

April 20, 1989

Mr. Lee Sesler
Versar, Inc.
P.O. Box 1549
6850 Versar Center
Springfield, VA 22151

Dear Mr. Sesler:

May this letter serve to confirm that Mr. Patrick Elmer and Mr. Ken Till participated and successfully completed the Tufts University Center for Environmental Management (formerly Asbestos Information Center) Asbestos Abatement for Inspectors and Management Planners five-day training course. Both gentlemen attended the February 15 - 19, 1988 course and received certificates from our institution.

Elmer - #8802-02-023 and #8802-02-087
Till - #8802-02-060 and #8802-02-124

We have no record of their attending the required Annual Review session at Tufts University.

Respectfully,

Anne Chabot

Anne Chabot
Program Development Coordinator

AC/cc

Curtis Hall
474 Boston Avenue
Medford, Massachusetts 02155
617/381-3486 General Information
617/381-3531 Division of Education and Training
617/381-3194 FAX

Alice Hamilton Occupational Health Center

This is to Certify that

Lee F. Sesler

has met the Attendance Requirements

and successfully completed the Course in

Asbestos Inspector/Management Planner Refresher

Course Director

January 20, 1989
Date

Registered Certificate

No: IMP-R-011

Expires on: January 20, 1990

The Georgia Institute of Technology

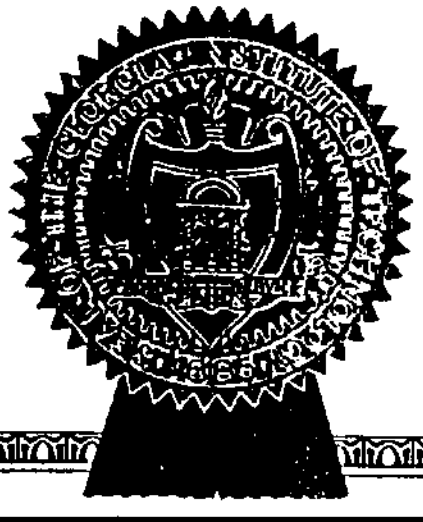
Lee Sesler

Has attended and satisfactorily passed an examination
covering the contents of a continuing education course entitled:

"INSPECTING BUILDINGS FOR ASBESTOS-CONTAINING MATERIALS"

071
Certificate Number

October 7, 1987
Date



Course Director

Exam Administrator

The Georgia Institute of Technology

Lee Sesler

Has attended and satisfactorily passed an examination
covering the contents of a continuing education course entitled:

"MANAGING ASBESTOS IN BUILDINGS"

344
Certificate Number

January 15, 1988
Date

Course Director

Rachel D. McCain
Exam Administrator

Aerosol Monitoring & Analysis, Inc.

This is to certify that

WILLIAM A. GIESEKING

has successfully completed a
8 hour training course entitled

EPA INSPECTOR/MANAGEMENT PLANNER RECERTIFICATION

Presented by Aerosol Monitoring & Analysis, Inc.

on APRIL 12, 1989

Location HANOVER, MARYLAND

Expires 4/12/90

Corporate Headquarters
P.O. Box 687
Hunt Valley, Md 21030

Certificate # 89-1679

DANIEL R. TWILLEY
Director

The Environmental Institute

William A. Gieseking

Has completed coursework and satisfactorily passed
an examination that meets all criteria required for the
EPA-Model Accreditation Course

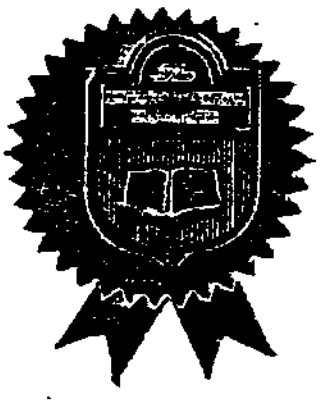
Asbestos in Buildings: Designing the Abatement Project

1158
Certificate Number

November 18, 1988
Date

Eva M Clay
Director, The Environmental Institute

Rachel Y. McCa
Exam Administrator



NATIONAL ASBESTOS TRAINING CENTER

The University of Kansas

WILLIAM A. GIESEKING

has completed a course and passed an examination in

Inspection/Management Planning for Asbestos Control—(AHERA)

DATE: FEBRUARY 8 - 12, 1988

EXAM DATE: FEBRUARY 10, 12, 1988

NUMBER: VIIKU85800-18

EXPIRES: MARCH 1, 1989

SOCIAL SECURITY #: 216-38-4222

Aerosol Monitoring & Analysis, Inc.

An AIHA Accredited Laboratory

This is to certify that

WILLIAM GIESEKING

has attended a

8 hour training course entitled

EPA ABATEMENT SUPERVISORY RECERTIFICATION

Presented by Aerosol Monitoring & Analysis, Inc.

on OCTOBER 18, 1988

Location THE LAKEFRONT, HUNT VALLEY, MARYLAND

Expires OCTOBER, 1989

Corporate Headquarters
P.O. Box 687
Hunt Valley, Md 21030

Certificate # 88-1279

Rebecca Fahey

Course Instructor

REBECCA FAHEY, TRAINING CONSULTANT

Aerosol Monitoring & Analysis, Inc.

An AIHA Accredited Laboratory

This is to certify that

WILLIAM A. GIESEKING

has attended a

32 hour training course entitled

4 DAY ABATEMENT SUPERVISOR/COMPETENT PERSON

Presented by Aerosol Monitoring & Analysis, Inc.

on NOVEMBER 10-13, 1987

Location CORPORATE HEADQUARTERS, HUNT VALLEY, MARYLAND

Expires NOVEMBER, 1988

Corporate Headquarters
P.O. Box 687
Hunt Valley, Md 21030

Certificate # 87-1126

Course Instructor

Daniel R. Twilley, Director of Training

This is to certify that

William Giesking

attended the

4th NATIONAL SERIES ON OPERATIONS & MAINTENANCE PLANNING

in New Brunswick, New Jersey on October 6, 1987

Sponsored by:

Hall-Kimbrell ENVIRONMENTAL SERVICES

W. D. Kimbrell

W. D. Kimbrell, President

GEORGIA INSTITUTE OF TECHNOLOGY

This is to certify that

WILLIAM ANDERSEN GIESEKING

has successfully completed

CLEARANCE TESTING FOR ASBESTOS:
AHERA REQUIREMENTS

conducted by
GEORGIA TECH
EDUCATION EXTENSION SERVICES
Atlanta, Georgia
OCTOBER 28-29, 1987

President

Director, Education Extension Services
Associate Vice President for Academic Affairs

Versar INC.

APPENDIX G

MANAGEMENT PLAN DEFERRAL REQUEST
AND
NOTIFICATION OF AVAILABILITY

State of Maryland

DEPARTMENT OF THE ENVIRONMENT
201 WEST PRESTON STREET • BALTIMORE, MARYLAND 21201
AREA CODE 301 • ~~225~~ XXX 631-3834

William Donald Schaefer
Governor

Martin W. Walsh, Jr.
Secretary

November 16, 1988

Mr. Richard C. Hunter
Superintendent of Public Instruction
Baltimore City Board of Education
200 E. North Avenue
Baltimore, Maryland 21202

NOV 21 REC'D

RE: Deferral Request - Approved

Log Number: Not Applicable

Dear Mr. Hunter:

This letter is to inform you that your 10/11/88 request for a deferral to May 9, 1989, for the submission of your asbestos management plan under the Asbestos Hazard Emergency Response Act (AHERA) has been approved.

Be advised, this deferral applies only to the requirement for submission of management plans. No other requirements of the AHERA regulations are affected by this deferral.

Should you have any questions about the submission of your management plans, or other AHERA related questions, please contact Ms. Janie Gordon, Program Manager, Office of School Asbestos Assistance at (301) 225-5755.

Sincerely,

Katherine P. Farrell, M.D., M.P.H.
Administrator
Center for Environmental Health

KPF/egs

HAND DELIVERY OF CORRECTED REQUEST:

Management Plan Deferral Request addressed to:

Dr. Katherine P. Farrell
The Maryland Department of the Environment
Center for Environmental Health

From: Dr. Richard C. Hunter
Baltimore City Public Schools

RECEIVED BY: [illegible]

DATE RECEIVED: 11/15/94 TIME: 10:30

Reviewed + Approved. Approval Letter To Follow.

JG.

CITY OF BALTIMORE

KURT L. SCHMOKE, Mayor

DEPARTMENT OF EDUCATION
RICHARD C. HUNTER
Superintendent of Public Instruction
200 E. North Avenue
Baltimore, Maryland 21202

October 11, 1988

Dr. Katherine P. Farrell, M.D., M.P.H.
Administrator
The Maryland Department of the Environment
Center for Environmental Health
P.O. Box 13387
Baltimore, Maryland 21203

Dear Dr. Farrell:

In accordance with Public Law 100-368, an amendment to AHERA, the Baltimore City Public Schools is requesting a deferral of deadline from October 12, 1988 to May 9, 1989 for the submission of Asbestos Management Plans. This request is made for all school buildings and related facilities, such as the Repair Shop, Electrical Shop, etc., under the authority of the Board of School Commissions of Baltimore City and as identified in **Attachment #1.**

The following assurances are provided as required by the amendment for Category B Deferrals:

Assurance 1 **(Attachment #2)**

A brief explanation why Baltimore City, despite good faith efforts, will not be able to meet the original October 12, 1988 deadline for submittal of its management plans.

Assurance 2 **(Attachment #3)**

Documentation filed at each school showing that an inspection has been completed in at least one other school under Baltimore City's authority.

Assurance 3 **(Attachment #4)**

Documentation that Baltimore City has attempted to notify all affected groups of their intent to request a deferral of submission deadline.

Assurance 4 (Attachment #5)

A proposed schedule outlining all significant activities leading up to the submission of the Management Plans by May 9, 1989.

We await your written response regarding the deferral of the submission deadline for Management Plans for Baltimore City Public Schools.

Very truly yours,

Richard C. Hunter
Superintendent of
Public Instruction

The accuracy of the information contained in this request for a deferral is hereby sworn to

Richard C. Hunter
Superintendent of
Public Instruction

STATE OF MARYLAND TO WIT: CITY OF BALTIMORE

I HEREBY CERTIFY THAT ON THIS 14th day of November, 19 88 before me, the Subscriber, A Notary Public of the State of Maryland in and for the City of Baltimore, personally appeared RICHARD C. HUNTER, Superintendent of Public Instruction and he acknowledged the afore going DEFERRAL REQUEST to be the act and deed of said BALTIMORE CITY PUBLIC SCHOOLS and in my presence signed the same.

WITNESS my hand and Notarial Seal,

NOTARY PUBLIC

My Commission expires: July 1, 1990

BLD NO.	BUILDING NAME	ADDRESS
PS004	STEWART HILL	30 S. GILMOR STREET
PS005	LANGSTON HUGHES	5011 ARBUTUS AVENUE
PS007	CECIL	2000 CECIL AVENUE
PS008	CITY SPRING	100 S. CAROLINE STREET
PS009	CARROLL PARK	1300 HERKIMER STREET
PS010	JAMES MCHENY	31 S. SCHROEDER STREET
PS011	EUTAW-MARSHBURN	1624 EUTAW PLACE
PS012	LAKELAND	2921 STRANDEN ROAD
PS013	TENCH TILGHMAN	600 N. PATTERSON PARK A
PS014	PARK HEIGHTS	4910 PARK HEIGHTS AVENUE
PS016	JOHNSON SQUARE	1101 VALLEY STREET
PS019	LEXINGTON TERRACE	732 W. LEXINGTON STREET
PS021	HILTON	3301 CARLISLE AVENUE
PS022	GEORGE WASHINGTON ELEM	1001 W. SARATOGA
PS023	GENERAL WOLFE	245 S. WOLFE STREET
PS024	WESTSIDE	2235 NORTH FULTON AVENUE
PS025	DR. RAYNOR BROWNE	1000 N. MONTFORD AVENUE
PS026	MADISON SQUARE	1401 E. BIDDLE STREET
PS027	COMMODORE RODGERS	100 N. CHESTER STREET
PS028	WILLIAM PINDERHUGHES	1200 N. FREMONT AVENUE
PS029	MATTHEW A. HENSON	1600 N. PAYSON STREET
PS030	GEORGE STREET	601 N. BROOKE STREET
PS031	COLDSTREAM PARK	400 EXETER HALL AVENUE
PS032	MILDRED MONROE	1634 GUILFORD AVENUE
PS034	BARRISTER CHARLES CARROLL	1327 WASHINGTON BOULEVARD
PS035	HARLEM PARK	1401 W. LAFAYETTE AVENUE
PS036	HARFORD HEIGHTS	1919 N. BROADWAY
PS038	MALCOLM X	2810 SHIRLEY AVENUE
PS039	DALLAS F. NICHOLAS, SR.	101 E. 21ST STREET
PS040	LAKE CLIFTON	2801 SAINT LO DRIVE
PS041	HAMILTON	5609 SEPTON AVENUE
PS042A	GARRISON	3910 BARRINGTON ROAD
PS042B	GARRISON	3810 BARRINGTON ROAD
PS043	HAMPSTEAD HILL	101 S. ELLWOOD AVENUE
PS044	MONTEBELLO	2040 E. 32ND STREET
PS045	FEDERAL HILL	1040 WILLIAM STREET
PS046	CHINQUAPIN	900 WOODBROOKE AVENUE
PS047	HAMPSTEAD HILL	500 S. LINWOOD AVENUE
PS049	NORTHEAST	5001 MORAVIA ROAD
PS050	ADMINISTRATION	1300 GORSUCH AVENUE
PS051	WAVERLY	3400 ELLERSLIE AVENUE
PS051A	WAVERLY	3400 ELLERSLIE AVENUE
PS051B	WAVERLY	3400 ELLERSLIE AVENUE
PS051C	WAVERLY	3400 ELLERSLIE AVENUE
PS051D	WAVERLY	3400 ELLERSLIE AVENUE
PS053	MARGARET BRENT	2601 ST. PAUL STREET
PS054	BARCLAY	2900 BARCLAY STREET
PS055	HAMPDEN	3608 CHESTNUT AVENUE
PS056	ROBERT POOLE	1300 W. 36TH STREET
PS057	LOMBARD	1500 E. LOMBARD STREET
PS058	ASHBURTON	3935 HILTON ROAD
PS058A	ASHBURTON	3935 HILTON ROAD

BLD NO.	BUILDING NAME	ADDRESS
PS058B	ASHBURTON	3935 HILTON ROAD
PS058C	ASHBURTON	3935 HILTON ROAD
PS058D	ASHBURTON	3935 HILTON ROAD
PS060	GWYNNS FALLS	2700 GWYNNS FALLS PARKWAY
PS060A	GWYNNS FALLS	2700 GWYNNS FALLS PARKWAY
PS060B	GWYNNS FALLS	2700 GWYNNS FALLS PARKWAY
PS061	JOHN EAGER HOWARD	2011 LINDEN AVENUE
PS062	EDGECOMBE CIRCLE	2835 VIRGINIA AVENUE
PS063	ROSEMONT	2777 PRESTMAN STREET
PS064	LIBERTY	3901 MAINE AVENUE
PS066	MOUNT ROYALE	121 MCMECHAN STREET
PS067	EDGEWOOD	1900 N. EDGEWOOD STREET
PS070	SOUTHERN	1100 COVINGTON STREET
PS073	SARAH M. ROACH	3494 OLD FREDERICK ROAD
PS075	CALVERTON	1100 WHITMORE AVENUE
PS076	FRANCIS SCOTT KEY	1425 E. FORT AVENUE
PS077	HERRING RUN	5001 SINCLAIR LANE
PS078	HARLEM PARK	1500 HARLEM AVENUE
PS079A	PORTABLE	2801 N. DUKE STREET
PS079	WILLIAM H. LEMMEL	2801 N. DUKELAND STREET
PS080	WEST BALTIMORE	201 N. BEND ROAD
PS081	OFFICES (#81)	181 N. BEND STREET
PS082	GREENSPRING	4701 GREENSPRING AVENUE
PS083	WILLIAM PACA	200 N. LAKEWOOD AVENUE
PS084	THOMAS JOHNSON	100 E. HEATH STREET
PS085	FORT WORTHINGTON	2701 E. OLIVER STREET
PS086	LAKEWOOD	2825 FEDERAL STREET
PS087	WINDSOR HILLS	4001 ALTO ROAD
PS088	LYNDHURST	601 WILDWOOD PARKWAY
PS089	ROGNEL HEIGHTS	4300 SIDEHILL ROAD
PS093	NORTHERN PARKWAY	2500 E. NORTHERN PARKWAY
PS095	FRANKLIN SQUARE	1400 W. LEXINGTON STREET
PS097	COLLINGTON SQUARE	1409 N. COLLINGTON AVENUE
PS098	SAMUEL B.F. MORSE	424-426 S. PULASKI STREET
PS101	ELMER A. HENDERSON	1101 N. WOLFE STREET
PS102	THOMAS G. HAYES	601 CENTRAL AVENUE
PS105	MORAVIA PARK	6201 FRANKFORD AVENUE
PS107	GILMOR	1821 N. GILMOR STREET
PS115	VENABLE	700 E. 34E STREET
PS117	DUKE ELLINGTON	790 W. NORTH AVENUE
PS122	SAMUEL COLERIDGE TAYLOR	507 W. PRESTON STREET
PS124	BAY BROOK	4301 10TH STREET
PS125	FURMAN L. TEMPLETON	1200 PENNSYLVANIA AVENUE
PS130	BOOKER T. WASHINGTON	1301 MCCULLOCH STREET
PS133	DUNBAR	500 N. CAROLINE STREET
PS134	WALTER P. CARTER	820 E. 43RD STREET
PS135	LUTHER CRAVEN MITCHELL	1731 E. CHASE STREET
PS138	HARRIETT TUBMAN	1807 HARLEM AVENUE
PS139	CHARLES CARROLL OF CARROLL	200 N. CENTRAL AVENUE
PS142	ROBERT COLEMAN	2400 WINDSOR AVENUE
PS144	JAMES MOSHER	1000 N. WHELLER AVENUE
PS145	ALEXANDER HAMILTON	800 POPLAR GROVE STREET

BLD NO.	BUILDING NAME	ADDRESS
PS150	BENTALOU	220 N.BENTALOU STREET
PS157	GEORGE G. NELSON	701 GOLD STREET
PS159	CHERRY HILL	801 BRIDGEVIEW ROAD
PS160	CARTER GODWIN WOODSON	2501 SEABURY ROAD
PS162	DIGGS-JOHNSON	501-503 W. BARRE STREET
PS163	PATAPSCO	844 ROUNDVIEW ROAD
PS164	ARUNDEL	2400 ROUND ROAD
PS175	GEO. BRAGG NATURE CENTER	6601 BALT. NATIONAL PIKE
PS177	GEORGE W. F. MCMECHEN	4411 GARRISON BOULEVARD
PS178	FRANCIS M. WOOD	100 N. CALHOUN STREET
PS180	CHERRY HILL	2700 SEAMON ROAD
PS201	DICKEY HILL	5025 DICKEY HILL ROAD
PS202	LAFAYETTE	850 BRADDISH AVENUE
PS203	MARCIE GARNETT FARRING	300 PONTIAC AVENUE
PS204	MARY RODMAN	3510 W. MULBERRY STREET
PS205	WOODHOME	7300 MOYER AVENUE
PS206	FURLEY	4033 FURLEY AVENUE
PS207	CURTIS BAY	4301 WEST BAY AVENUE
PS209	WINSTON	1101 WINSTON AVENUE
PS210	HAZELWOOD	4517 HAZELWOOD AVENUE
PS211	GARDEN VILLE	5300 BELAIR ROAD
PS212	GARRETT HEIGHTS	2800 AILSA AVENUE
PS213	GOVANS	5801 YORK ROAD
PS214	GUILFORD #214	4520 YORK ROAD
PS215	HIGHLANDTOWN	3223 PRATT STREET
PS216	FRANKFORD	8001 FRANKFORD AVENUE
PS217	BELMONT	1406 N. ELLAMONT STREET
PS219	YORKWOOD	5931 YORKWOOD ROAD
PS220	MORRELL PARK	2501 TOLLEY STREET
PS221	MOUNT WASHINGTON	1801 SULGRAVE AVENUE
PS222	PIMLICO	3500 W. NORTHERN PARKWAY
PS222A	PIMLICO	3500 W. NORTHERN PARKWAY
PS223	PIMLICO	4849 PIMLICO ROAD
PS224	GROVE PARK	5545 HENNISON AVENUE
PS225	WESTPORT	2401 NEVADA STREET
PS226	VIOLETVILLE	1207 PINE HEIGHTS AVENUE
PS228	JOHN RUHRAH	701 RAPPOLLA STREET
PS229	EDLABIRD	1500 IMLA STREET
PS230	CANTON	801 S. HIGHLAND AVENUE
PS231	BREHMS LANE	3536 BREHMS LANE
PS232	THOMAS JEFFERSON	605 DRYDEN DRIVE
PS233	ROLAND PARK	5207 ROLAND AVENUE
PS234	ARLINGTON	3705 W. ROGERS AVENUE
PS235	GLENMOUNT	6211 WALTHER AVENUE
PS236	HAMILTON	6101 OLD HARFORD ROAD
PS237	HIGHLANDTOWN	231 S. EATON STREET
PS238	VICTORY	1440 CHESAPEAKE AVENUE
PS239	BENJAMIN FRANKLIN	1201 CAMBRIA STREET
PS240	GRACELAND PARK-O'DONNELL	6300 O'DONNELL STREET
PS241	FALLSTAFF	3801 FALLSTAFF ROAD
PS241A	FALLSTAFF	3501 FALLSTAFF ROAD
PS242	NORTHWOOD	5201 LOCH RAVEN BOULEVARD

BLD NO.	BUILDING NAME	ADDRESS
PS242A	NORTHWOOD	5201 LOCH RAVEN BOULEVARD
PS243	ARMISTEAD GARDENS	5001 E. EAGER STREET
PS245	LEITH WALK	1235 SHERWOOD AVENUE
PS245A	LEITH WALK	1235 SHERWOOD AVENUE
PS246	BEECHFIELD	301 BEECHFIELD AVENUE
PS247	CROSS COUNTRY	6100 CROSS COUNTRY BLVD.
PS248	SINCLAIR LANE	3880 SINCLAIR LANE
PS249	MEDFIELD HEIGHTS	4300 BUCHANAN AVENUE
PS250	DR. BERNARD HARRIS. SR.	1400 N. CAROLINE STREET
PS251	CALLAWAY	3701 FERNHILL AVENUE
PS254	DR. MARTIN LUTHER KING, JR.	3750 GREENSPRING AVENUE
PS255	SOUTHEAST	6820 FAIT AVENUE
PS256	CALVIN RODWELL	3501 HILLSDALE ROAD
PS260	FREDERICK	2501 FREDERICK AVENUE
PS261	LOCKERMAN-BUNDY	301 N. PULASKI STREET
PS301	WILLIAM S. BAER ELEMENTARY	2001 WARWICK AVENUE
PS303	UPTON	811 W. LANVALE
PS304	HARBOR VIEW ELEMENTARY	4301 10TH AVENUE
PS307	CLAREMONT ELEMENTARY	5301 ERDMAN AVENUE
PS310	FERNHILL ELEMENATRY	3915 FERNHILL AVENUE
PS313	LOIS T. MURRAY	1600 E. ARLINGTON AVENUE
PS314	SHARP-LEADENHALL	150 W. WEST STREET
PS315	DR. LILLIE M. JACKSON	1501 ASBURTON STREET
PS353A	WOODBURN CENTER	1301 WOODBURN AVE
PS400	EDMONDSON	501 N. ATHOL AVENUE
PS401	NORTHWESTERN	6900 PARK HEIGHTS AVENUE
PS402	NORTHERN	2201 PINEWOOD AVENUE
PS403	CCD POLYTECH #403	1400 COLDSPRING LANE
PS405	PATTERSON	100 LANE STREET
PS406	FOREST PARK	3401 ELDORADO AVENUE
PS407	WESTERN	4600 FALLS ROAD
PS410	MERGENTHALER	3500 HILLEN ROAD
PS411	WALBROOK	2000 EDGEWOOD STREET
PS412	SOUTHWESTERN	200 FONTHILL AVENUE
PS413	HARBOR CITY LEARNING CTR.	4801 LIBERTY HEIGHTS AVE.
PS414	PAUL LAURENCE DUNBAR	1400 ORLEANS STREET
PS415	SCHOOL FOR THE ARTS	708-712 CATHEDRAL STREET
PS420	WEST SIDE SKILLED CENTER	4501 EDMONDSON AVENUE
PS450	FREDERICK DOUGLAS	2301 GWYNNS FALLS PARKWAY
PS451	JOSEPH C. BRESCOE	5506 W. BELDLE STREET
PS453	FAIRMOUNT HILL	100 N. ANN STREET
PS454	CARVER	2201 PRESSTMAN STREET
PS456	HARFORD INSTITUTE	2555 HARFORD ROAD
PS457	LAURENCE G. PAQUIN	2200 SINCLAIR LANE
PS480	BALTIMORE CITY COLLEGE	3220 THE ALAMEDA
PS504	REPAIR SHOP	1230 E. 20th ST.
PS513	KID'S DINER	SARATOGA & HOLIDAY
PS525	WAREHOUSE	1149 E. GRANBY ST.
PS528	XPORTATION GARAGE & OFFICE	1210 E. 20th ST.
PS534A	ELECTRICAL SHOP:	1812 GREENMOUNT AVENUE
PS534B	ELECTRICAL SHOP:	1812 GREENMOUNT AVENUE
PS540	SCHOOL HEADQUARTERS	200 E. NORTH AVE.

BLD NO.	BUILDING NAME	ADDRESS
PS556	GROUNDS SHOP	2014 PENNSYLVANIA AVENUE
PS557	OFFICE WAREHOUSE (#557)	2200 ROSS STREET
PS564	BUS XPORTATION GARAGE&OFF.	1604 BRADDISH AVE.
PS701	KIRK AV. STADIUM	KIRK & EXETER HALL AVE.

ATTACHMENT #2

STATEMENT AS TO WHY BALTIMORE CITY CANNOT MEET THE ORIGINAL 10/12/88 DEADLINE.

Baltimore City Public Schools has attempted to meet the October 12 deadline by retaining Versar, Inc. to inspect their buildings and to develop Management Plans for same. Versar must confer with the Baltimore City Public Schools in order to develop the schedules for response actions which, in turn, are dependent upon the aggregate cost of the Management Plans. While Versar has been at work on this project since late Spring, they cannot complete their contract obligations in time to permit the City to assess the budget implications and develop an appropriate schedule and still meet the October 12 deadline.

ATTACHMENT #3

Versar INC.

To School _____

Versar, Inc. has been employed by the City of Baltimore, Department of Education to prepare asbestos-containing materials management plans in accordance with EPA requirements. We are currently in the process of preparing a management plan for this school based on an on-site inspection and the analysis of bulk samples of suspect materials taken during the inspection.

Very truly yours,

Lawrence G. Davies

Lawrence G. Davies
Program Manager

12445-A

6850 VERSAR CENTER • P.O. BOX 1549 • SPRINGFIELD, VIRGINIA 22151 • TELEPHONE: (703) 750-3000 • TELEX: 901125

ATTACHMENT #4

The Sun
Sunday October 2 1988

NOTICE OF PUBLIC HEARING

The Board of School Commissioners of the Baltimore City Public Schools will hold a public hearing on October 6, 1988 to discuss the adoption of Submitting Asbestos Management Plans as required by the Asbestos Hazard Emergency Response Act (AHERA) for all city schools. Management Plans are to be submitted to the Governor on October 12, 1988. However, in accordance with an amendment signed by President Reagan on June 16, 1988, state educational agencies can request a deferral until May 9, 1989.

This deferral request does not alter or in any way affect the July 9 1988 deadline for implementation of the Management Plans.

The Public Hearing will be held at 7 p.m. at the following address: BALTIMORE CITY PUBLIC SCHOOLS ROOM 103 ADMINISTRATIVE HEADQUARTERS 200 E. NORTH AVENUE BALTIMORE MARYLAND 21202

DATE: Tuesday, October 6, 1988

ATTACHMENT #4

BALTIMORE CITY PUBLIC SCHOOLS
BALTIMORE, MARYLAND 21202
Office of
The Superintendent of Public Instruction

September 27, 1988

To: Principals, Union Leaders, and Parent Organization Leaders

From: Richard C. Hunter, Superintendent of Public Instruction

Subject: Hearing on Deferral of Asbestos Management Plans

The accompanying letter explains an important public hearing to be held by the Board of School Commissioners on October 6. Because the hearing is crucial to our asbestos management program, I am asking that you help us publicize the meeting as widely as you can. Principals, please see that copies of the letter go home with students. Union leaders and parent group leaders, please see that copies are distributed to your members. Thank you for assisting us with this important meeting.

/jd

CITY OF BALTIMORE

KURT L. SCHMOKE, Mayor

DEPARTMENT OF EDUCATION
RICHARD C. HUNTER
Superintendent of Public Instruction
200 E. North Avenue
Baltimore, Maryland 21202

September 26, 1988

Dear Parents, Students, and Personnel of the Baltimore City Public Schools:

The Board of School Commissioners will hold a public hearing on October 6, 1988 at 6:30 p.m. at 200 E. North Avenue, Room 107. The purpose of this hearing is to discuss a deferral of management plans for asbestos-containing materials in our elementary and secondary schools. These plans are required by the Asbestos Hazard Emergency Response Act (AHERA) which was signed into law by President Reagan on October 22, 1986. The plans were to be submitted to the governor by October 12, 1988. However, this date can be extended to May 9, 1989 if local educational agencies can show a good faith effort to comply with the October date.

Management plans include inspection reports, sample analyses, physical assessments, response actions, and time and cost schedules. Once this information is documented, the Baltimore City Public Schools personnel must review the response actions and cost allocations with members of the city's Asbestos Program to ensure affordability. Versar, Inc., the company doing our inspections, analysis, assessments, and development of response actions, has advised that they will not complete their portion of the plans in time for us to develop schedules and still comply with the October 12 deadline. We are, therefore, recommending that the submission of the management plans be deferred until May 9, 1989.

Deferral requests must be discussed at a public hearing in accordance with AHERA requirements. A submission deferral of the management plans will not affect the AHERA requirement that all plans be implemented by July 9, 1989.

Your attendance at the October 6 hearing is invited.

Very truly yours,

Richard C. Hunter
Superintendent of Public Instruction

RCH:jc

ATTACHMENT #5

PROPOSED SCHEDULE FOR SUBMISSION OF MANAGEMENT PLANS BY MAY 9, 1989

ACTIVITY	COMPLETION DATE
* INSPECTIONS BY VERSAR, INC.	NOVEMBER 30, 1988
LABORATORY ANALYSIS	JANUARY 15, 1988
DEVELOPMENT OF INDIVIDUAL SCHOOL MANAGEMENT PLANS BY VERSAR INC.	JANUARY 15, 1989
DEVELOPMENT OF NARRATIVE FLOOR PLANS BY BALTIMORE CITY ASBESTOS OFFICE	APRIL 1, 1989
ASSIGNING OF TIME SCHEDULES AND FUNDING ALLOTMENTS BY BALTIMORE CITY PUBLIC SCHOOLS AND BALTIMORE CITY ASBESTOS PROGRAM	April 28, 1989
SUBMISSION OF MANAGEMENT PLANS TO MARYLAND DEPARTMENT OF THE ENVIRONMENT, CENTER FOR ENVIRONMENTAL HEALTH	MAY 9, 1989

*The attached letter from Versar, Inc. (Attachment 5A) clarifying the completion date for the LABORATORY ANALYSIS is to become part of the Proposed Schedule above.

ATTACHMENT 5A

Versar Inc.

November 14, 1988

Mr. William A. Gieseking
Baltimore City Public Schools
Physical Plant
Room 407
200 East North Ave.
Baltimore, MD 21202

Dear Mr. Gieseking:

The laboratory analyses of all bulk asbestos samples taken in support of the production of AHERA management plans for Baltimore City Schools will be completed no later than 15 January 1989.

Very truly yours,

Larry Davies

Lawrence G. Davies
Program Manager

LGD:scr

12445-18

State of Maryland

DEPARTMENT OF THE ENVIRONMENT
201 WEST PRESTON STREET • BALTIMORE, MARYLAND 21201
AREA CODE 301 • 225-5755

William Donald Schaefer
Governor

Martin W. Walsh, Jr.
Secretary

November 1, 1988

Mr. Richard C. Hunter
Superintendent of Public Instruction
Balto. City Board of Education
200 E. North Avenue
Baltimore, MD 21202

RE: Deferral Request - Denied

Log Number: Not Applicable

Dear Sir:

This letter is to inform you that your request for a deferral to May 9, 1989, for the submission of your asbestos management plan is not complete.

The Asbestos Hazard Emergency Response Act (AHERA) requires the following information be submitted under Category B Deferrals. The items checked below were determined to be either missing or incomplete.

___ A list of all schools covered by the request.

_X_ A statement, the accuracy of which is sworn to by a responsible official of the agency (by notorization or other means of certification), that includes the following information with respect to each school for which a deferral is sought in the request. Statement must be notarized.

___ Assurance 1: A statement and brief explanation why the LEA, despite good faith efforts, will not be able to meet the original October 12, 1988, deadline for submittal of its management plan.

___ Assurance 2: A statement that the LEA has made at least one of the following documents available for inspection at each school for which a deferral is sought:

a. A solicitation by the LEA to contract with an accredited asbestos contractor for inspection or management plan development.

b. A letter certifying that school district personnel are enrolled in an EPA-approved training course for inspection and management plan development.

c. Documentation showing that suspected asbestos-containing material from the school is being analyzed at an accredited laboratory.

d. Documentation showing that an inspection or management plan has been completed in at least one other school under the LEA's authority.

_____ Assurance 3: A statement giving assurance that the LEA has carried out notification of affected groups and, in the case of a public school, a public meeting. (Again, the new law requires that before filing a deferral request, an LEA shall notify affected parent, teacher, and employee organizations of its intent to file its request. In the case of a public school, the LEA shall discuss the request at a public meeting of the school board, and affected organizations shall be notified in advance of the time and place of the meeting.)

__x__ Assurance 4: A proposed schedule outlining all significant activities leading up to submission of a management plan by May 9, 1989, including the inspection of the school. This schedule must contain a deadline of no later than December 22, 1988, for entering into a contract with an accredited inspector (unless inspections are to be performed by accredited school personnel). Laboratory analysis and management plan development must also be included in the activity schedule. Specify proposed date of completion for each activity.

You may correct and refile your request no later than 15 days upon receipt of this letter. Should you have any questions regarding the submission of Deferral Request or other AHERA related questions, contact Ms. Janie Gordon, Program Manager, Office of School Asbestos Assistance at (301) 225-5755.

Sincerely,

Katherine P. Farrell, M.D., M.P.H.
Administrator
Center for Environmental Health

KPF:ae

HAND DELIVERY OF:

Management Plan Deferral Request addressed to:

Dr. Katherine P. Farrell
The Maryland Department of the Environment
Center for Environmental Health

From: Dr. Richard C. Hunter
Baltimore City Public Schools

RECEIVED BY: [signature]

DATE RECEIVED: 12/11/95 TIME: 3 P.M.

CITY OF BALTIMORE

KURT L. SCHMOKE, Mayor

DEPARTMENT OF EDUCATION

RICHARD C. HUNTER
Superintendent of Public Instruction
200 E. North Avenue
Baltimore, Maryland 21202

October 11, 1988

Dr. Katherine P. Farrell, M.D., M.P.H.
Administrator
The Maryland Department of the Environment
Center for Environmental Health
P.O. Box 13367
Baltimore, Maryland 21203

Dear Dr. Farrell:

In accordance with Public Law 100-368, an amendment to AHERA, the Baltimore City Public Schools is requesting a deferral of deadline from October 12, 1988 to May 9, 1989 for the submission of Asbestos Management Plans. This request is made for all school buildings and related facilities, such as the Repair Shop, Electrical Shop, etc., under the authority of the Board of School Commissions of Baltimore City and as identified in **Attachment #1.**

The following assurances are provided as required by the amendment for Category B Deferrals:

Assurance 1 (Attachment #2)

A brief explanation why Baltimore City, despite good faith efforts, will not be able to meet the original October 12, 1988 deadline for submittal of its management plans.

Assurance 2 (Attachment #3)

Documentation filed at each school showing that an inspection has been completed in at least one other school under Baltimore City's authority.

Assurance 3 (Attachment #4)

Documentation that Baltimore City has attempted to notify all affected groups of their intent to request a deferral of submission deadline.

Assurance 4 (Attachment #5)

A proposed schedule outlining all significant activities leading up to the submission of the Management Plans by May 9, 1989.

We await your written response regarding the deferral of the submission deadline for Management Plans for Baltimore City Public Schools.

Very truly yours,

Richard C. Hunter

Richard C. Hunter
Superintendent of
Public Instruction

BALTIMORE CITY SCHOOL MANAGEMENT PLAN LIST 06-Oct-88

BLD NO.	BUILDING NAME	ADDRESS
PS004	STEWART HILL	30 S. GILMOR STREET
PS005	LANGSTON HUGHES	5011 ARBUTUS AVENUE
PS007	CECIL	2000 CECIL AVENUE
PS008	CITY SPRING	100 S. CAROLINE STREET
PS009	CARROLL PARK	1300 HERKIMER STREET
PS010	JAMES MCHENY	31 S. SCHROEDER STREET
PS011	EUTAW-MARSHBURN	1624 EUTAW PLACE
PS012	LAKELAND	2921 STRANDEN ROAD
PS013	TENCH TILGHMAN	600 N. PATTERSON PARK A
PS014	PARK HEIGHTS	4910 PARK HEIGHTS AVENUE
PS016	JOHNSON SQUARE	1101 VALLEY STREET
PS019	LEXINGTON TERRACE	732 W. LEXINGTON STREET
PS021	HILTON	3301 CARLISLE AVENUE
PS022	GEORGE WASHINGTON ELEM	1001 W. SARATOGA
PS023	GENERAL WOLFE	245 S. WOLFE STREET
PS024	WESTSIDE	2235 NORTH FULTON AVENUE
PS025	DR. RAYNOR BROWNE	1000 N. MONTFORD AVENUE
PS026	MADISON SQUARE	1401 E. BIDDLE STREET
PS027	COMMODORE RODGERS	100 N. CHESTER STREET
PS028	WILLIAM PINDERHUGHES	1200 N. FREMONT AVENUE
PS029	MATHEW A. HENSON	1600 N. PAYSON STREET
PS030	GEORGE STREET	601 N. BRUNE STREET
PS031	COLDSTREAM PARK	400 EXETER HALL AVENUE
PS032	MILDRED MONROE	1634 GUILFORD AVENUE
PS034	BARRISTER CHARLES CARROLL	1327 WASHINGTON BOULEVARD
PS035	HARLEM PARK	1401 W. LAFAYETTE AVENUE
PS036	HARFORD HEIGHTS	1919 N. BROADWAY
PS038	MALCOLM X	2810 SHIRLEY AVENUE
PS039	DALLAS F. NICHOLAS, SR.	101 E. 21ST STREET
PS040	LAKE CLIFTON	2801 SAINT LO DRIVE
PS041	HAMILTON	5609 SEITON AVENUE
PS042A	GARRISON	3910 BARRINGTON ROAD
PS042B	GARRISON	3910 BARRINGTON ROAD
PS043	HAMPSTEAD HILL	101 S. ELLWOOD AVENUE
PS044	MONTEBELLO	2040 E. 32ND STREET
PS045	FEDERAL HILL	1040 WILLIAM STREET
PS046	CHINQUAPIN	900 WOODBROUNE AVENUE
PS047	HAMPSTEAD HILL	500 S. LINWOOD AVENUE
PS049	NORTHEAST	5001 MORAVIA ROAD
PS050	ADMINISTRATION	1300 GORSUCH AVENUE
PS051	WAVERLY	3400 ELLERSLIE AVENUE
PS051A	WAVERLY	3400 ELLERSLIE AVENUE
PS051B	WAVERLY	3400 ELLERSLIE AVENUE
PS051C	WAVERLY	3400 ELLERSLIE AVENUE
PS051D	WAVERLY	3400 ELLERSLIE AVENUE
PS053	MARGARET BRENT	2601 ST. PAUL STREET
PS054	BARCLAY	2900 BARCLAY STREET
PS055	HAMPDEN	3608 CHESTNUT AVENUE
PS056	ROBERT POOLE	1300 W. 36TH STREET
PS057	LOMBARD	1500 E. LOMBARD STREET
PS058	ASHBURTON	3935 HILTON ROAD
PS058A	ASHBURTON	3935 HILTON ROAD

BLD NO.	BUILDING NAME	ADDRESS
PS058B	ASHBURTON	3935 HILTON ROAD
PS058C	ASHBURTON	3935 HILTON ROAD
PS058D	ASHBURTON	3935 HILTON ROAD
PS060	GWYNNS FALLS	2700 GWYNNS FALLS PARKWAY
PS060A	GWYNNS FALLS	2700 GWYNNS FALLS PARKWAY
PS060B	GWYNNS FALLS	2700 GWYNNS FALLS PARKWAY
PS061	JOHN EAGER HOWARD	2011 LINDEN AVENUE
PS062	EDGECOMBE CIRCLE	2835 VIRGINIA AVENUE
PS063	ROSEMONT	2777 PRESTMAN STREET
PS064	LIBERTY	3901 MAINE AVENUE
PS066	MOUNT ROYALE	121 MCMECHAN STREET
PS067	EDGEWOOD	1900 N. EDGEWOOD STREET
PS070	SOUTHERN	1100 COVINGTON STREET
PS073	SARAH M. ROACH	3434 OLD FREDERICK ROAD
PS075	CALVERTON	1100 WHITMORE AVENUE
PS076	FRANCIS SCOTT KEY	1425 E. FORT AVENUE
PS077	HERRING RUN	5001 SINCLAIR LANE
PS078	HARLEM PARK	1500 HARLEM AVENUE
PS079A	PORTABLE	2801 N. DUKE STREET
PS079	WILLIAM H. LEMMEL	2801 N. DUKELAND STREET
PS080	WEST BALTIMORE	201 N. BEND ROAD
PS081	OFFICES (#81)	181 N. BEND STREET
PS082	GREENSPRING	4701 GREENSPRING AVENUE
PS083	WILLIAM PACA	200 N. LAKEWOOD AVENUE
PS084	THOMAS JOHNSON	100 E. HEATH STREET
PS085	FORT WORTHINGTON	2701 E. OLIVER STREET
PS086	LAKEWOOD	2625 FEDERAL STREET
PS087	WINDSOR HILLS	4001 ALTO ROAD
PS088	LYNDHURST	621 WILDWOOD PARKWAY
PS089	ROGNEL HEIGHTS	4300 SIDEHILL ROAD
PS093	NORTHERN PARKWAY	2500 E. NORTHERN PARKWAY
PS095	FRANKLIN SQUARE	1400 W. LEXINGTON STREET
PS097	COLLINGTON SQUARE	1409 N. COLLINGTON AVENUE
PS098	SAMUEL B.F. MORSE	424-426 S. PULASKI STREET
PS101	ELMER A. HENDERSON	1101 N. WOLFE STREET
PS102	THOMAS G. HAYES	601 CENTRAL AVENUE
PS105	MORAVIA PARK	6201 FRANKFORD AVENUE
PS107	GILMOR	1321 N. GILMOR STREET
PS115	VENABLE	700 E. 34H STREET
PS117	DUKE ELLINGTON	790 W. NORTH AVENUE
PS122	SAMUEL COLERIDGE TAYLOR	507 W. PRESTON STREET
PS124	BAY BROOK	4301 10TH STREET
PS125	FURMAN L. TEMPLETON	1200 PENNSYLVANIA AVENUE
PS130	BOOKER T. WASHINGTON	1301 MCCULLOCH STREET
PS133	DUNBAR	500 N. CAROLINE STREET
PS134	WALTER P. CARTER	820 E. 43RD STREET
PS135	LUTHER CRAVEN MITCHELL	1731 E. CHASE STREET
PS138	HARRIETT TUBMAN	1807 HARLEM AVENUE
PS139	CHARLES CARROLL OF CARROLL	200 N. CENTRAL AVENUE
PS142	ROBERT COLEMAN	2400 WINDSOR AVENUE
PS144	JAMES MOSHER	1000 N. WHEELER AVENUE
PS145	ALEXANDER HAMILTON	800 POPLAR GROVE STREET

BLD NO.	BUILDING NAME	ADDRESS
PS150	BENTALOU	220 N.BENTALOU STREET
PS157	GEORGE G. KELSON	701 GOLD STREET
PS159	CHERRY HILL	801 BRIDGEVIEW ROAD
PS160	CARTER GODWIN WOODSON	2501 SEABURY ROAD
PS162	DIGGS-JOHNSON	501-503 W. BARRE STREET
PS163	PATAPSCO	844 ROUNDVIEW ROAD
PS164	ARUNDEL	2400 ROUND ROAD
PS175	GEO. BRAGG NATURE CENTER	6601 BALT. NATIONAL PIKE
PS177	GEORGE W. F. MCMECHEN	4411 GARRISON BOULEVARD
PS178	FRANCIS M. WOOD	100 N. CALHOUN STREET
PS180	CHERRY HILL	2700 SEAMON ROAD
PS201	DICKEY HILL	5025 DICKEY HILL ROAD
PS202	LAFAYETTE	850 BRADDISH AVENUE
PS203	MARCIE GARNETT FARRING	300 PONTIAC AVENUE
PS204	MARY RODMAN	3510 W. MULBERRY STREET
PS205	WOODHOME	7300 MOYER AVENUE
PS206	FURLEY	4633 FURLEY AVENUE
PS207	CURTIS BAY	4301 WEST BAY AVENUE
PS209	WINSTON	1101 WINSTON AVENUE
PS210	HAZELWOOD	4517 HAZELWOOD AVENUE
PS211	GARDEN VILLE	5300 BELAIR ROAD
PS212	GARRETT HEIGHTS	2800 AILSA AVENUE
PS213	GOVANS	5801 YORK ROAD
PS214	GUILFORD #214	4520 YORK ROAD
PS215	HIGHLANDTOWN	3223 PRATT STREET
PS216	FRANKFORD	6001 FRANKFORD AVENUE
PS217	BELMONT	1406 N. ELLAMONT STREET
PS219	YORKWOOD	5931 YORKWOOD ROAD
PS220	MORRELL PARK	2601 TOLLEY STREET
PS221	MOUNT WASHINGTON	1801 SULGRAVE AVENUE
PS222	PIMLICO	3500 W. NORTHERN PARKWAY
PS222A	PIMLICO	3500 W. NORTHERN PARKWAY
PS223	PIMLICO	4849 PIMLICO ROAD
PS224	GROVE PARK	5545 KENNISON AVENUE
PS225	WESTPORT	2401 NEVADA STREET
PS226	VIOLETVILLE	1207 PINE HEIGHTS AVENUE
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PS314	SHARP-LEADENHALL	150 W. WEST STREET
PS315	DR. LILLIE M. JACKSON	1501 ASBURTON STREET
PS353A	WOODBURN CENTER	1301 WOODBURN AVE
PS400	EDMONDSON	501 N. ATHOL AVENUE
PS401	NORTHWESTERN	6900 PARK HEIGHTS AVENUE
PS402	NORTHERN	2201 PINEWOOD AVENUE
PS403	COB POLYTECH #403	1400 COLDSPRING LANE
PS405	PATTERSON	100 LANE STREET
PS406	FOREST PARK	3401 ELDORADO AVENUE
PS407	WESTERN	4600 FALLS ROAD
PS410	MERGENTHALER	3500 HILLEN ROAD.
PS411	WALBROOK	2000 EDGEWOOD STREET
PS412	SOUTHWESTERN	200 FONTHILL AVENUE
PS413	HARBOR CITY LEARNING CTR.	4801 LIBERTY HEIGHTS AVE.
PS414	PAUL LAURENCE DUNBAR	1400 ORLEANS STREET
PS415	SCHOOL FOR THE ARTS	706-712 CATHEDRAL STREET
PS420	WEST SIDE SKILLED CENTER	4501 EDMONDSON AVENUE
PS450	FREDERICK DOUGLAS	2301 GWYNNS FALLS PARKWAY
PS451	JOSEPH C. BRESCOE	5506 W. BIDDLE SREET
PS453	FAIRMOUNT HILL	100 N. ANN STREET
PS454	CARVER	2201 PRESSTMAN STREET
PS456	HARFORD INSTITUTE	2555 HARFORD ROAD
PS457	LAURENCE G. PAQUIN	2200 SINCLAIR LANE
PS480	BALTIMORE CITY COLLEGE	3220 THE ALAMEDA
PS504	REPAIR SHOP	1230 E. 20th ST.
PS513	KID'S DINER	SARATOGA & HOLIDAY
PS525	WAREHOUSE	1149 E. GRANBY ST.
PS528	IMPORTATION GARAGE & OFFICE	1210 E. 20th ST.
PS534A	ELECTRICAL SHOP:	1812 GREENMOUNT AVENUE
PS534B	ELECTRICAL SHOP:	1812 GREENMOUNT AVENUE
PS540	SCHOOL HEADQUARTERS	200 E. NORTH AVE.

BALTIMORE CITY SCHOOL MANAGEMENT PLAN LIST 06-Oct-88

BLD NO.	BUILDING NAME	ADDRESS
PS556	GROUNDS SHOP	2614 PENNSYLVANIA AVENUE
PS557	OFFICE WAREHOUSE (#557)	2200 ROBB STREET
PS564	BUS XPORTATION GARAGE&OFF.	1664 BRADDISH AVE.
PS701	KIRK AV. STADIUM	KIRK & EXETER HALL AVE.

ATTACHMENT #2

STATEMENT AS TO WHY BALTIMORE CITY CANNOT MEET THE ORIGINAL 10/12/88 DEADLINE.

Baltimore City Public Schools has attempted to meet the October 12 deadline by retaining Versar, Inc. to inspect their buildings and to develop Management Plans for same. Versar must confer with the Baltimore City Public Schools in order to develop the schedules for response actions which, in turn, are dependent upon the aggregate cost of the Management Plans. While Versar has been at work on this project since late Spring, they cannot complete their contract obligations in time to permit the City to assess the budget implications and develop an appropriate schedule and still meet the October 12 deadline.

ATTACHMENT #3

Versar INC.

To School _____

Versar, Inc. has been employed by the City of Baltimore, Department of Education to prepare asbestos-containing materials management plans in accordance with EPA requirements. We are currently in the process of preparing a management plan for this school based on an on-site inspection and the analysis of bulk samples of suspect materials taken during the inspection.

Very truly yours,

Lawrence G. Davies

Lawrence G. Davies
Program Manager

12445-4

6850 VERSAR CENTER • P.O. BOX 1549 • SPRINGFIELD, VIRGINIA 22151 • TELEPHONE: (703) 750-3000 • TELEX: 901125

ATTACHMENT #4

NOTICE OF PUBLIC HEARING

The Board of School Commissioners of the Baltimore City Public Schools will hold a public hearing on October 8, 1985 to discuss the criteria of Asbestos Abatement Management Plans as required by the Asbestos Hazard Emergency Response Act (AHERA) for all City schools. Management Plans are to be submitted to the Governor on October 12, 1985 pursuant to an amendment signed by President Reagan on June 12, 1984. Local educational agencies can request a deferral until June 9, 1988.

This deferral request does not alter or in any way affect the June 9, 1988 deadline for implementation of the Management Plans.

The public hearing will be held at 3 p.m. in the BALTIMORE CITY PUBLIC SCHOOL ROOM 410 ADMINISTRATIVE HEADQUARTERS 200 E. NORTH AVENUE BALTIMORE, MARYLAND 21202

TIME: 3:30 P.M.

DATE: October 8, 1985

ATTACHMENT #4

BALTIMORE CITY PUBLIC SCHOOLS
BALTIMORE, MARYLAND 21202
Office of
The Superintendent of Public Instruction

September 27, 1988

To: Principals, Union Leaders, and Parent Organization Leaders

From: Richard C. Hunter, Superintendent of Public Instruction

Subject: Hearing on Deferral of Asbestos Management Plans

The accompanying letter explains an important public hearing to be held by the Board of School Commissioners on October 6. Because the hearing is crucial to our asbestos management program, I am asking that you help us publicize the meeting as widely as you can. Principals, please see that copies of the letter go home with students. Union leaders and parent group leaders, please see that copies are distributed to your members. Thank you for assisting us with this important meeting.

/jd

CITY OF BALTIMORE

KURT L. SCHMOKE, Mayor

DEPARTMENT OF EDUCATION
RICHARD C. HUNTER
Superintendent of Public Instruction
200 E. North Avenue
Baltimore, Maryland 21202

September 26, 1988

Dear Parents, Students, and Personnel of the Baltimore City Public Schools:

The Board of School Commissioners will hold a public hearing on October 6, 1988 at 6:30 p.m. at 200 E. North Avenue, Room 107. The purpose of this hearing is to discuss a deferral of management plans for asbestos-containing materials in our elementary and secondary schools. These plans are required by the Asbestos Hazard Emergency Response Act (AHERA) which was signed into law by President Reagan on October 22, 1986. The plans were to be submitted to the governor by October 12, 1988. However, this date can be extended to May 9, 1989 if local educational agencies can show a good faith effort to comply with the October date.

Management plans include inspection reports, sample analyses, physical assessments, response actions, and time and cost schedules. Once this information is documented, the Baltimore City Public Schools personnel must review the response actions and cost allocations with members of the city's Asbestos Program to ensure affordability. Versar, Inc., the company doing our inspections, analysis, assessments, and development of response actions, has advised that they will not complete their portion of the plans in time for us to develop schedules and still comply with the October 12 deadline. We are, therefore, recommending that the submission of the management plans be deferred until May 9, 1989.

Deferral requests must be discussed at a public hearing in accordance with AHERA requirements. A submission deferral of the management plans will not affect the AHERA requirement that all plans be implemented by July 9, 1989.

Your attendance at the October 6 hearing is invited.

Very truly yours,

Richard C. Hunter
Superintendent of Public Instruction

RCH:jd

ATTACHEMENT #5

PROPOSED SCHEDULE FOR SUBMISSION OF MANAGEMENT PLANS BY MAY 9, 1989

ACTIVITY	COMPLETION DATE
INSPECTIONS BY VERSAR, INC.	NOVEMBER 30, 1988
DEVELOPMENT OF INDIVIDUAL SCHOOL MANAGEMENT PLANS BY VERSAR INC.	JANUARY 15, 1989
DEVELOPMENT OF NARRATIVE FLOOR PLANS BY BALTIMORE CITY ASBESTOS OFFICE	APRIL 1, 1989
ASSIGNING OF TIME SCHEDULES AND FUNDING ALLOTMENTS BY BALTIMORE CITY PUBLIC SCHOOLS AND BALTIMORE CITY ASBESTOS PROGRAM	April 28, 1989
SUBMISSION OF MANAGEMENT PLANS TO MARYLAND DEPARTMENT OF THE ENVIRONMENT, CENTER FOR ENVIRONMENTAL HEALTH	MAY 9, 1989

Versar INC.

NOTIFICATION OF AVAILABILITY

BALTIMORE CITY PUBLIC SCHOOLS
BALTIMORE, MARYLAND 21202
Office of
The Superintendent of Public Instruction

Circular No. 114
Series 1988-89
April 13, 1989
DIVISION OF PHYSICAL PLANT

Availability of
Asbestos Management Plans

TO: Deputy Superintendent, Chief Financial Officer, Associate and Assistant Superintendents, Executive Directors, Heads of Central Office Units, and Principals

FROM: Richard C. Hunter, Superintendent of Public Instruction
Mr. Judson Porter, Chief Financial Officer
Curtis E. Lantz, Assistant Superintendent, Division of Physical Plant

In October 1986, the U.S. Congress enacted the Asbestos Hazard Emergency Response Act (AHERA). Under this law, comprehensive regulations were developed to address asbestos problems in public and private elementary and secondary schools. These regulations require schools to inspect for friable and nonfriable asbestos, develop asbestos management plans that address asbestos hazards in school buildings and implement response actions in a timely manner.

These regulations assign schools many new responsibilities. Our program for fulfilling these responsibilities is outlined in the asbestos management plan for each school. The plans currently contain the inspection reports and the appropriate response actions. They, also, contain plans for periodic reinspections and post-response activities if any.

Delivery of Asbestos Management Plans to schools will begin May 1, 1989. The receipt of these management plans will require acknowledgement by the Principal or Vice Principal. On May 9, 1989, the Asbestos Management Plans will be delivered to the Governor as required by law.

As of May 9, 1989, the Asbestos Management Plans will be available for review at the following locations:

- at the Main Office of each school during normal school hours

- at the Division of Physical Plant, Room 407, 200 E. North Avenue, Baltimore, Maryland 21202 during normal business hours.

Please advise your staff of the availability of these plans. Principals will be receiving under separate cover letters advising parents, union leaders and parent organization leaders of the availability of these plans. These letters are to be distributed to parents and employees associated with their respective school.

APPROVAL OF CIRCULARS

EGO

TO: DR. RICHARD C. HUNTER, SUPERINTENDENT OF PUBLIC INSTRUCTION

RE: CIRCULARS FOR EXAMINATION AND APPROVAL OR CORRECTION

RCH — (APPROVED) DISAPPROVED
SUPERINTENDENT'S INITIALS

APPROVED DISAPPROVED
DEPUTY SUPERINTENDENT'S INITIALS

APPROVED DISAPPROVED
CHIEF FINANCIAL OFFICER'S INITIALS

APPROVED DISAPPROVED
CABINET MEMBER INITIALS

COMMENTS: April 5, 1989 memo to Principals, Union Leaders, and Parent Organization Leaders ref: Availability of Management Plans

COLOR: _____ DATE SUBMITTED: _____

BY: _____

BALTIMORE CITY PUBLIC SCHOOLS
BALTIMORE, MARYLAND 21202
Office of
The Superintendent of Public Instruction

April 5, 1989

To: Principals, Union Leaders, and Parent Organization Leaders

From: Richard C. Hunter, Superintendent of Public Instruction

Subject: Availability of Management Plans

The accompanying letter briefly explains the Asbestos Hazard Emergency Response Act (AHERA). The Asbestos Management Plans are the Baltimore City Public Schools' response to that act. Because the availability of these plans are crucial to our Asbestos Management Program, I am asking that you help us publicize their availability as widely as you can.

Principals, please see that copies of the letter go home with students and are distributed to all staff within your building. **Union Leaders** and **parent group leaders**, please see that copies of the letter are distributed to your members.

Thank you for assisting us with this important task.

CITY OF BALTIMORE

KURT L. SCHMOKE, Mayor

DEPARTMENT OF EDUCATION

RICHARD C. HUNTER
Superintendent of Public Instruction
200 E. North Avenue
Baltimore, Maryland 21202

April 5, 1989

Dear Parents and Personnel of the Baltimore City Public Schools:

AVAILABILITY OF ASBESTOS MANAGEMENT PLANS

In October 1986, the U.S. Congress enacted the Asbestos Hazard Emergency Response Act (AHERA). Under this law, comprehensive regulations were developed to address asbestos problems in public and private elementary and secondary schools. These regulations require schools to inspect for friable and nonfriable asbestos, develop asbestos management plans that address asbestos hazards in school buildings and implement response actions in a timely manner.

These regulations assign schools many new responsibilities. Our program for fulfilling these responsibilities is outlined in the asbestos management plan for each school. The plans currently contain the inspection reports and the appropriate response actions. They, also, contain plans for periodic reinspections and post-response activities if any.

Delivery of Asbestos Management Plans to schools will begin May 1, 1989. On May 9, 1989, the Asbestos Management Plans will be delivered to the Governor as required by law.

As of May 9, 1989, the Asbestos Management Plans will be available for review at the following locations:

- at the Main Office of each school
- at the Division of Physical Plant, Room 407, 200 E. North Avenue, Baltimore, Maryland 21202 during normal business hours.

Very truly yours,

Richard C. Hunter

Richard C. Hunter
Superintendent of Public Instruction

CITY OF BALTIMORE

KURT L. SCHMOKE, Mayor

DEPARTMENT OF EDUCATION
RICHARD C. HUNTER
Superintendent of Public Instruction
200 E. North Avenue
Baltimore, Maryland 21202

May 1, 1989

Dear Principal and/or Vice Principal:

In accordance with the Asbestos Hazard Response Act (AHERA), each school is required to maintain a copy of its respective Asbestos Management Plan in their administrative office. These plans are to be made available for inspection by the public without cost or restriction.

The bound copy of the Asbestos Management Plan being delivered to your school today includes the following:

- A list of all Baltimore City Public Schools by name and address and including inventory data indicating whether or not there is asbestos within your building.

- Dated Copy of Notification of availability of Asbestos Management Plans.

- Site specific asbestos management data.

- The following Appendices:

  A - Lab Analysis Sheets and Chain of Custody Data
  B - Selected excerpts from Final Rule 40 CFR Part 763 for asbestos containing materials in schools.
  C - Data pertaining to all response actions which have taken place at the school since the original inspection.
  D - Abatement Schedule for Asbestos Containing Materials.
  E - Site specific O&M contractor abatement procedures.
  F - Copies of certification certificates for inspectors, management planners and Designated LEA Representative.
  G - Copy of BCPS submission deferral letters and subsequent approval letters from the State of Maryland.
  H - Floor plans showing bulk sampling locations.

Section 207(a) of Title II of the Act and Section 15(1)(D) of the Act make it unlawful for any LEA or person to fail or refuse to

retain this copy of the Asbestos Management Plan in the administrative office. Failure to do so can result in fines being levied by the Environmental Protection Agency against the Baltimore City Public Schools, as well as, individuals who refuse to comply.

A meeting will be scheduled at a later date to have a representative from the consultant who developed the management plan, Versar, Inc., meet with you to review and discuss your Asbestos Management Plan in depth.

Very truly yours,

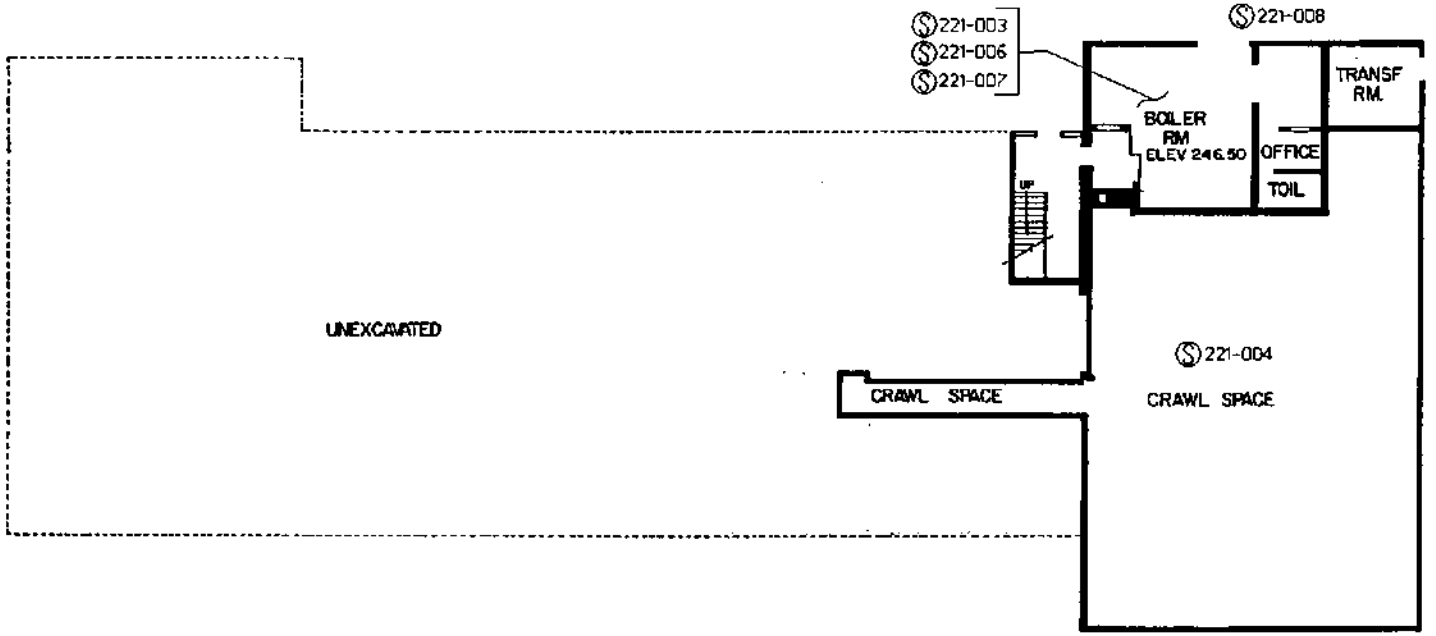
Richard C. Hunter
Superintendent of
Public Instruction

Versar INC.

APPENDIX H

FLOOR PLAN WITH SAMPLE LOCATIONS

BALTO CODE	VERSAR CODE
221-001	PS221-002-007-LS
	PS221-002-008-LS
	PS221-002-009-LS
	PS221-003-002-LS
	PS221-003-003-LS
	PS221-004-001-LS
221-002	PS221-002-005-LS
	PS221-004-002-LS
	PS221-004-003-LS
	PS221-002-006-LS
	PS221-003-001-LS
	PS221-003-004-LS
221-003	PS221-001-008-LS
221-004	PS221-002-003-LS
	PS221-002-003-LS
221-005	PS221-001-005-LS
	PS221-001-006-LS
	PS221-001-007-LS
	PS221-002-001-LS
	PS221-002-002-LS
	PS221-002-004-LS
221-006	PS221-001-003-LS



BASEMENT FLOOR PLAN ELEV 25.00

0 4 8 16

TYPICAL OF BUILDING
S221-001
S221-002
S221-005

BALTIMORE CITY PUBLIC SCHOOLS

MT. WASHINGTON ELEM. SCHOOL
100 SULGRAVE AVE. 21209

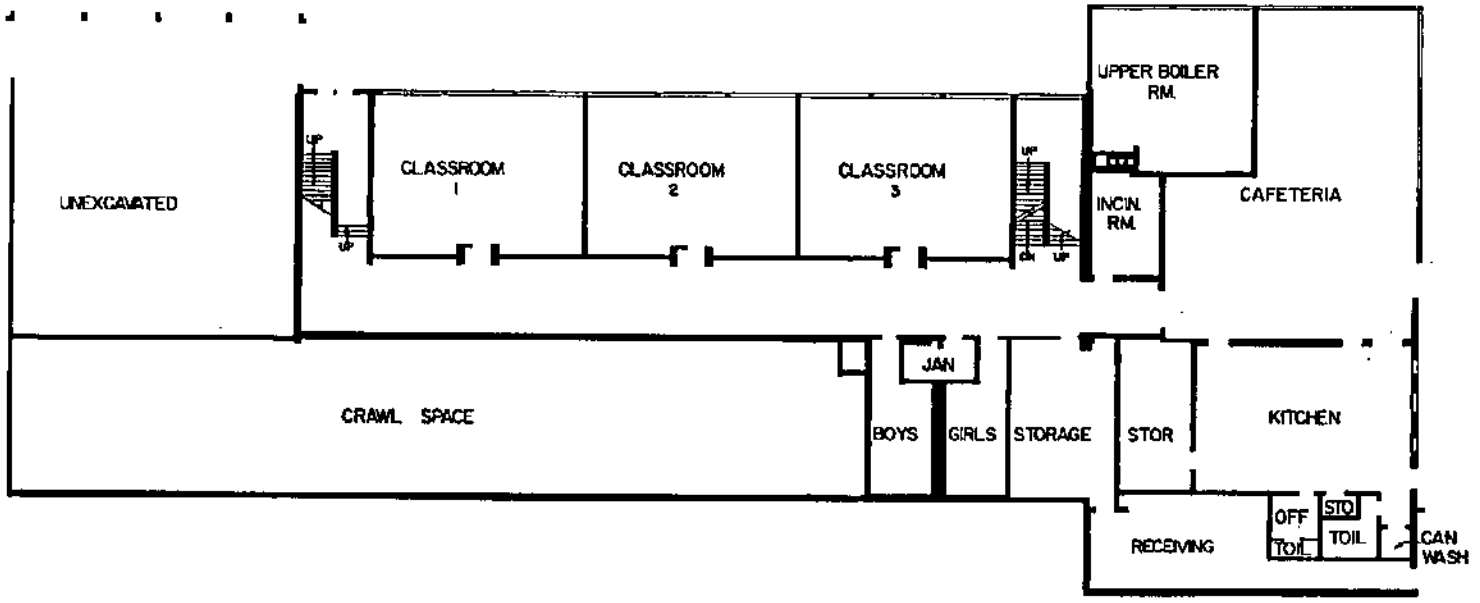
SCHEMATIC PLAN AS INDICATED

221

DURTH LANTZ J.L. HENLEY

K. SALMOND C. WASHINGTON

221 B 1 2 04 A 0 0 0 0 C 0



GROUND FLOOR PLAN ELEV 256.50

0 4 8 16

TYPICAL OF BUILDING

Ⓢ221-001
Ⓢ221-002
Ⓢ221-005

BALTIMORE CITY PUBLIC SCHOOLS

MT WASHINGTON ELEM. SCHOOL
3901 SULGRAVE AVE. 21208
SCHEMATIC PLAN AS INDICATED

221

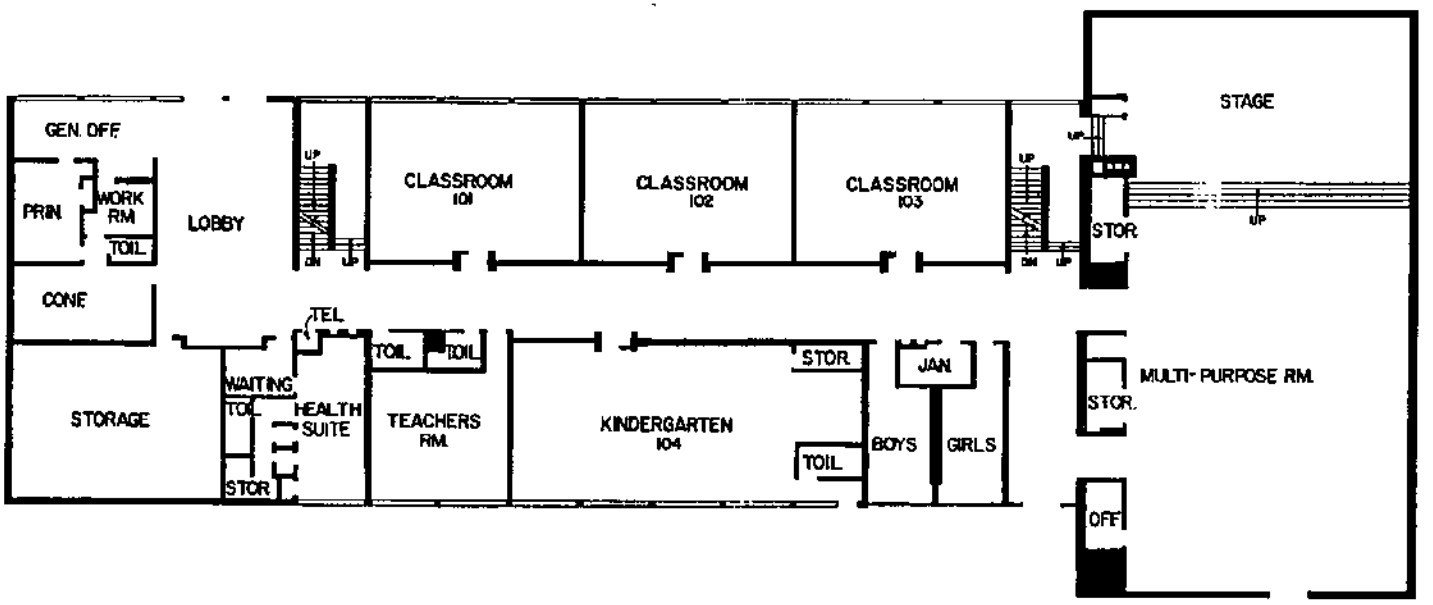
12-4-81

CURTIS LANTZ J.L. HENLEY

E.L. SAVAGE

R.RAYMOND
C.WASHINGTON

22 18 11 12 04 A 0 0 0 0 0



FIRST FLOOR PLAN ELEV. 266.50

0 4 8 16

TYPICAL OF BUILDING

(S)221-001
(S)221-002
(S)221-005

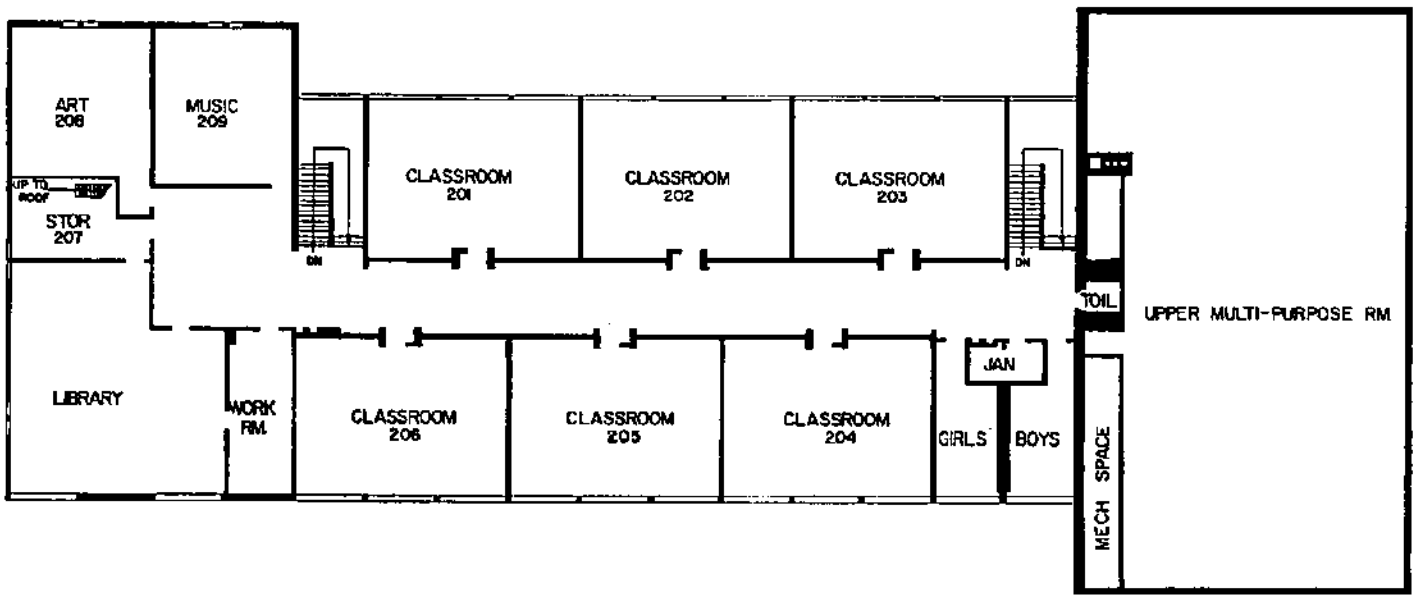
BALTIMORE CITY PUBLIC SCHOOLS

MT. WASHINGTON ELEM. SCHOOL

221

CURTIS LANCZ J.L. HENLEY

E.L. SAVAGE K. SALMOND



SECOND FLOOR PLAN ELEV 276.50

0 4 8 16

TYPICAL OF BUILDING

(S)221-001
(S)221-002
(S)221-005

BALTIMORE CITY PUBLIC SCHOOLS
DIVISION OF PHYSICAL PLANT

MT WASHINGTON ELEM. SCHOOL

HOLSTEAD AVE. & KELLY AVE.

SCHEMATIC PLAN AS INDICATED

221

CURTIS LANTZ J.L. HENLEY

E.L. BARGE C. WASHINGTON

AMENDMENT NO. 1

DATED SEPTEMBER 20, 1989

TO

ASBESTOS-CONTAINING
MATERIALS MANAGEMENT
PLAN

DATED MAY 9, 1989

FOR

MOUNT WASHINGTON ELEMENTARY SCHOOL

PS 221

ISSUED BY THE

BALTIMORE CITY PUBLIC SCHOOLS

ASBESTOS COORDINATOR AND

DESIGNATED LOCAL EDUCATION

AGENCY REPRESENTATIVE

BALTIMORE CITY PUBLIC SCHOOLS

AMENDMENT NO. 1
DATED: SEPTEMBER 20, 1989

TO THE MANAGEMENT PLAN

A. TO SECTION 3.0 - in the 3rd paragraph the wording "preparing the ACM assessment" means the person signing at the end of this paragraph actually made the ACM assessment and is responsible for it.

B. To SECTION 7 IN 7.1,2 "CLEANING" - Delete the present paragraphs and insert the following. "Additional cleaning is not recommended. The LEA agrees with the recommendation."

C. TO THE ASBESTOS-CONTAINING BUILDING MATERIALS (ACBM) INVENTORY BY BUILDING LIST - pages III, IV, V, VI, and VII are replaced with the attached pages Rev. dated September 20, 1989.

TO THE MANAGEMENT PLAN APPENDICES

D. TO APPENDIX D - SCHEDULE FOR RESPONSE ACTIONS - The attached Response Action Schedule dated September 20, 1989 replaces the original schedule issued with the management plan.

E. TO APPENDIX H - Add the following note to the floor plans and the management plan section 1.2. "Sample locations described within the Management Plans can be located within the building by a red or black spot of spray paint and the corresponding sample number written in permanent ink adjacent to the sample location. Also, a floor plan with sample locations marked upon it is located within Appendix H."

BALTIMORE CITY SCHOOL MANAGEMENT PLAN LIST

ASBESTOS-CONTAINING BUILDING MATERIALS (ACBM) INVENTORY BY BUILDING

BULDING NUMBER *	BUILDING NAME	ADDRESS	FRIABLE ACBM	NON-FRIABLE ACBM	ASSUMED FRIABLE ACBM	ASSUMED NON-FRIABLE ACBM	NO ACBM FOUND	NO SUSPECT MATERIAL

ASBESTOS-CONTAINING BUILDING MATERIALS (ACBM) INVENTORY BY BUILDING

BULDING NUMBER *	BUILDING NAME	ADDRESS	FRIABLE ACBM	NON-FRIABLE ACBM	ASSUMED FRIABLE ACBM	ASSUMED NON-FRIABLE ACBM	NO ACBM FOUND	NO SUSPECT MATERIAL
PS004	STEWART HILL	30 S. GILMOR STREET	X	X		X		
PS005	LANGSTON HUGHES	5011 ARBUTUS AVENUE		X		X		
PS007	CECIL	2000 CECIL AVENUE	X	X		X		
PS008	CITY SPRING	100 S. CAROLINE STREET	X	X		X		
PS009	CARROLL PARK	1300 HERKIMER STREET	X			X		
PS010	JAMES McHENRY	31 S. SCHROEDER STREET	X			X		
PS011	EUTAW-MARSHBURN	1624 EUTAW PLACE	X			X		
PS011A	EUTAW-MARSHBURN	1624 EUTAW PLACE	X					
PS012	LAKELAND	2921 STRANDEN ROAD	X	X		X		
PS013	TENCH TILGHMAN	600 N. PATTERSON PARK A		X		X		
PS014	PARK HEIGHTS	4910 PARK HEIGHTS AVENUE		X		X		
PS016	JOHNSON SQUARE	1101 VALLEY STREET	X	X		X		
PS019	LEXINGTON TERRACE	732 W. LEXINGTON STREET	X			X		
PS021	HILTON	3301 CARLISLE AVENUE	X	X	X	X		
PS022M	GEORGE WASHINGTON	800 SCOTT STREET					X	
PS023	GENERAL WOLFE	245 S. WOLFE STREET		X		X		
PS024	WESTSIDE	2235 NORTH FULTON AVENUE	X	X		X		
PS025	DR. RAYNOR BROWNE	1000 N. MONTFORD AVENUE		X	X	X		
PS026	MADISON SQUARE	1401 E. BIDDLE STREET	X	X		X		
PS027	COMMODORE RODGERS	100 N. CHESTER STREET	X			X		
PS028	WILLIAM PINDERHUGHES	1200 N. FREMONT AVENUE		X		X		
PS029	MATHEW A. HENSON	1600 N. PAYSON STREET	X	X		X		
PS030	GEORGE STREET	601 N. BRUNE STREET	X	X	X	X		
PS031	COLDSTREAM PARK	400 EXETER HALL AVENUE	X	X		X		
PS032	MILDRED MONROE	1634 GUILFORD AVENUE	X	X		X		
PS034	BARRISTER CHARLES CARROLL	1327 WASHINGTON BOULEVARD		X		X		
PS035	HARLEM PARK	1401 W. LAFAYETTE AVENUE	X	X				
PS036	HARFORD HEIGHTS	1919 N. BROADWAY	X	X		X		
PS038	MALCOLM X	2810 SHIRLEY AVENUE	X	X		X		
PS039	DALLAS F. NICHOLAS, SR.	101 E. 21ST STREET		X		X		
PS040	LAKE CLIFTON	2801 SAINT LO DRIVE	X	X	X	X		
PS041	HAMILTON	5609 SEFTON AVENUE	X	X		X		
PS042A	GARRISON	3910 BARRINGTON ROAD	X		X			
PS042B	GARRISON	3910 BARRINGTON ROAD	X			X		
PS043	HAMPSTEAD HILL	101 S. ELLWOOD AVENUE	X	X	X			
PS044	MONTEBELLO	2040 E. 32ND STREET	X	X	X			
PS045	FEDERAL HILL	1040 WILLIAM STREET	X	X		X		

BALTIMORE CITY SCHOOL MANAGEMENT PLAN LIST

ASBESTOS-CONTAINING BUILDING MATERIALS (ACBM) INVENTORY BY BUILDING

BULDING NUMBER *	BUILDING NAME	ADDRESS	FRIABLE ACBM	NON-FRIABLE ACBM	ASSUMED FRIABLE ACBM	ASSUMED NON-FRIABLE ACBM	NO ACBM FOUND	NO SUSPECT MATERIAL
PS046	CHINQUAPIN	900 WOODBROUNE AVENUE	X	X		X		
PS047	HAMPSTEAD HILL	500 S. LINWOOD AVENUE	X	X		X		
PS049	NORTHEAST	5001 MORAVIA ROAD		X		X		
PS050	ADMINISTRATION	1300 GORSUCH AVENUE	X	X		X		
PS051	WAVERLY	3400 ELLERSLIE AVENUE	X	X		X		
PS051A	WAVERLY	3400 ELLERSLIE AVENUE					X	
PS051B	WAVERLY	3400 ELLERSLIE AVENUE					X	
PS051C	WAVERLY	3400 ELLERSLIE AVENUE					X	
PS051D	WAVERLY	3400 ELLERSLIE AVENUE					X	
PS053	MARGARET BRENT	2601 ST. PAUL STREET				X		
PS054	BARCLAY	2900 BARCLAY STREET	X	X		X		
PS055	HAMPDEN	3608 CHESTNUT AVENUE		X		X		
PS056	ROBERT POOLE	1300 W. 36TH STREET	X	X		X		
PS057	LOMBARD	1500 E. LOMBARD STREET	X	X		X		
PS058	ASHBURTON	3935 HILTON ROAD	X	X		X		
PS058A	ASHBURTON	3935 HILTON ROAD					X	
PS058B	ASHBURTON	3935 HILTON ROAD					X	
PS058C	ASHBURTON	3935 HILTON ROAD					X	
PS058D	ASHBURTON	3935 HILTON ROAD					X	
PS060	GWYNNS FALLS	2700 GWYNNS FALLS PARKWAY	X	X		X		
PS060A	GWYNNS FALLS	2700 GWYNNS FALLS PARKWAY		X		X		
PS060B	GWYNNS FALLS	2700 GWYNNS FALLS PARKWAY		X		X		
PS060C	GWYNNS FALLS	2700 GWYNNS FALLS PARKWAY				X		
PS061	JOHN EAGER HOWARD	2011 LINDEN AVENUE	X	X		X		
PS062	EDGECOMBE CIRCLE	2835 VIRGINIA AVENUE	X	X		X		
PS063	ROSEMONT	2777 PRESTMAN STREET	X	X		X		
PS064	LIBERTY	3901 MAINE AVENUE		X		X		
PS066	MOUNT ROYALE	121 MCMECHAN STREET	X	X		X		
PS067	EDGEWOOD	1900 N. EDGEWOOD STREET	X	X	X			
PS070	SOUTHERN	1100 COVINGTON STREET	X	X		X		
PS073	SARAH M. ROACH	3434 OLD FREDERICK ROAD	X	X		X		
PS075	CALVERTON	1100 WHITMORE AVENUE	X	X	X			
PS076N	FRANCIS SCOTT KEY	1425 EAST FORT AVENUE					X	
PS077	HERRING RUN	5001 SINCLAIR LANE	X	X		X		
PS078	HARLEM PARK	1500 HARLEM AVENUE	X	X	X	X		
PS079A	PORTABLE	2801 N. DUKE STREET	X		X			
PS079	WILLIAM H. LEMMEL	2801 N. DUKELAND STREET	X	X		X		
PS080	WEST BALTIMORE	201 N. BEND ROAD (R)	X	X		X		
PS081	OFFICES (#81)	181 N. BEND STREET	X	X		X		
PS082	GREENSPRING	4701 GREENSPRING AVENUE	X			X		
PS083	WILLIAM PACA	200 N. LAKEWOOD AVENUE	X	X		X		
PS084	THOMAS JOHNSON	100 E. HEATH STREET	X	X		X		
PS085	FORT WORTHINGTON	2701 E. OLIVER STREET	X	X	X	X		
PS086	LAKEWOOD	2625 FEDERAL STREET	X			X		
PS087	WINDSOR HILLS	4001 ALTO ROAD	X	X	X			
PS088	LYNDHURST	621 WILDWOOD PARKWAY	X	X		X		
PS089	ROGNEL HEIGHTS	4300 SIDEHILL ROAD	X	X		X		

BALTIMORE CITY SCHOOL MANAGEMENT PLAN LIST

ASBESTOS-CONTAINING BUILDING MATERIALS (ACBM) INVENTORY BY BUILDING

BULDING NUMBER *	BUILDING NAME	ADDRESS	FRIABLE ACBM	NON-FRIABLE ACBM	ASSUMED FRIABLE ACBM	ASSUMED NON-FRIABLE ACBM	NO ACBM FOUND	NO SUSPECT MATERIAL
PS093	NORTHERN PARKWAY	2500 E. NORTHERN PARKWAY	X	X	X			
PS095	FRANKLIN SQUARE	1400 W. LEXINGTON STREET	X	X	X	X		
PS097	COLLINGTON SQUARE	1409 N. COLLINGTON AVENUE	X			X		
PS098	SAMUEL B.F. MORSE	424-426 S. PULASKI STREET (R)		X		X		
PS101	ELMER A. HENDERSON	1101 N. WOLFE STREET	X	X		X		
PS102	THOMAS G. HAYES	601 CENTRAL AVENUE	X	X	X	X		
PS105	MORAVIA PARK	6201 FRANKFORD AVENUE	X	X		X		
PS107	GILMOR	1321 N. GILMOR STREET	X	X		X		
PS115	VENABLE	700 E. 34H STREET	X	X		X		
PS117	DUKE ELLINGTON	790 W. NORTH AVENUE		X	X			
PS122	SAMUEL COLERIDGE TAYLOR	507 W. PRESTON STREET	X	X		X		
PS124	BAY BROOK	4301 10TH STREET	X			X		
PS125	FURMAN L. TEMPLETON	1200 PENNSYLVANIA AVENUE		X		X		
PS130	BOOKER T. WASHINGTON	1301 MCCULLOCH STREET	X	X	X			
PS133	DUNBAR	500 N. CAROLINE STREET	X			X		
PS134	WALTER P. CARTER	820 E. 43RD STREET (R)		X		X		
PS135	LUTHER CRAVEN MITCHELL	1731 E. CHASE STREET			X			
PS138	HARRIETT TUBMAN	1807 HARLEM AVENUE		X	X			
PS139	CHARLES CARROLL OF CARROLL	200 N. CENTRAL AVENUE	X	X		X		
PS142	ROBERT COLEMAN	2400 WINDSOR AVENUE		X		X		
PS144	JAMES MOSHER	1000 N. WHELLER AVENUE	X	X		X		
PS145	ALEXANDER HAMILTON	800 POPLAR GROVE STREET		X		X		
PS150	BENTALOU	220 N.BENTALOU STREET	X	X	X			
PS157	GEORGE G. KELSON	701 GOLD STREET	X	X		X		
PS159	CHERRY HILL	801 BRIDGEVIEW ROAD	X	X	X	X		
PS160	CARTER GODWIN WOODSON	2501 SEABURY ROAD	X	X		X		
PS161	GEORGE WASHINGTON	1001 W. SARATOGA	X	X				
(413)								
PS163	PATAPSCO	844 ROUNDVIEW ROAD	X	X		X		
PS164	ARUNDEL	2400 ROUND ROAD	X	X		X		
PS175	GEO. BRAGG NATURE CENTER	6601 BALT. NATIONAL PIKE	X			X		
PS177	GEORGE W. F. McMECHEN	4411 GARRISON BOULEVARD				X		
PS178	FRANCIS M. WOOD	100 N. CALHOUN STREET				X		
PS180	CHERRY HILL	2700 SEAMON ROAD	X	X		X		
PS201	DICKEY HILL	5025 DICKEY HILL ROAD	X	X		X		
PS202	LAFAYETTE	850 BRADDISH AVENUE	X	X		X		
PS203	MARCIE GARNETT FARRING	300 PONTIAC AVENUE		X		X		
PS204	MARY RODMAN	3510 W. MULBERRY STREET	X	X		X		
PS205	WOODHOME	7300 MOYER AVENUE	X	X		X		
PS206	FURLEY	4633 FURLEY AVENUE	X	X	X	X		
PS207	CURTIS BAY	4301 WEST BAY AVENUE	X	X		X		
PS209	WINSTON	1101 WINSTON AVENUE	X	X		X		
PS210	HAZELWOOD	4517 HAZELWOOD AVENUE	X	X	X	X		
PS211	GARDEN VILLE	5300 BELAIR ROAD	X	X		X		
PS212	GARRETT HEIGHTS	2800 AILSA AVENUE	X	X		X		
PS213	GOVANS	5801 YORK ROAD	X	X		X		
PS214	GUILFORD #214	4520 YORK ROAD	X	X		X		

BALTIMORE CITY SCHOOL MANAGEMENT PLAN LIST

ASBESTOS-CONTAINING BUILDING MATERIALS (ACBM) INVENTORY BY BUILDING

BULDING NUMBER *	BUILDING NAME	ADDRESS	FRIABLE ACBM	NON-FRIABLE ACBM	ASSUMED FRIABLE ACBM	ASSUMED NON-FRIABLE ACBM	NO ACBM FOUND	NO SUSPECT MATERIAL
PS215	HIGHLANDTOWN	3223 PRATT STREET		X		X		
PS216	FRANKFORD	6001 FRANKFORD AVENUE	X			X		
PS217	BELMONT	1406 N. ELLAMONT STREET	X	X	X	X		
PS219	YORKWOOD	5931 YORKWOOD ROAD	X	X		X		
PS220	MORRELL PARK	2601 TOLLEY STREET		X		X		
PS221	MOUNT WASHINGTON	1801 SULGRAVE AVENUE	X	X	X			
PS222	PIMLICO	3500 W. NORTHERN PARKWAY	X	X		X		
PS222A	PIMLICO	3500 W. NORTHERN PARKWAY		X				
PS223	PIMLICO	4849 PIMLICO ROAD	X	X	X			
PS224	GROVE PARK	5545 KENNISON AVENUE	X	X		X		
PS225	WESTPORT	2401 NEVADA STREET		X		X		
PS226	VIOLETVILLE	1207 PINE HEIGHTS AVENUE	X	X		X		
PS228	JOHN RUHRAH	701 RAPPOLLA STREET	X	X		X		
PS229	HOLABIRD	1500 IMLA STREET	X	X		X		
PS230	CANTON	801 S. HIGHLAND AVENUE	X			X		
PS231	BREHMS LANE	3636 BREHMS LANE	X	X	X			
PS232	THOMAS JEFFERSON	605 DRYDEN DRIVE	X	X		X		
PS233	ROLAND PARK	5207 ROLAND AVENUE	X	X		X		
PS234	ARLINGTON	3705 W. ROGERS AVENUE	X	X	X	X		
PS235	GLENMOUNT	6211 WALTHER AVENUE	X	X		X		
PS236	HAMILTON	6101 OLD HARFORD ROAD	X	X	X	X		
PS237	HIGHLANDTOWN	231 S. EATON STREET	X	X	X	X		
PS238	VICTORY	1440 CHESAPEAKE AVENUE	X	X		X		
PS239	BENJAMIN FRANKLIN	1201 CAMBRIA STREET	X	X				
PS240	GRACELAND PARK-O'DONNELL	6300 O'DONNELL STREET	X	X	X			
PS241	FALLSTAFF	3801 FALLSTAFF ROAD	X	X		X		
PS241A	FALLSTAFF	3801 FALLSTAFF ROAD (R)		X				
PS242	NORTHWOOD	5201 LOCH RAVEN BOULEVARD	X	X	X			
PS242A	NORTHWOOD	5201 LOCH RAVEN BOULEVARD	X	X		X		
PS243	ARMISTEAD GARDENS	5001 E. EAGER STREET	X	X	X			
PS245	LEITH WALK	1235 SHERWOOD AVENUE	X	X	X			
PS245A	LEITH WALK	1235 SHERWOOD AVENUE	X			X		
PS246	BEECHFIELD	301 BEECHFIELD AVENUE	X	X		X		
PS247	CROSS COUNTRY	6100 CROSS COUNTRY BLVD.	X	X		X		
PS248	SINCLAIR LANE	3880 SINCLAIR LANE	X	X		X		
PS249	MEDFIELD HEIGHTS	4300 BUCHANAN AVENUE	X	X	X	X		
PS250	DR. BERNARD HARRIS, SR.	1400 N. CAROLINE STREET	X			X		
PS251	CALLAWAY	3701 FERNHILL AVENUE	X	X				
PS254	DR. MARTIN LUTHER KING, JR.	3750 GREENSPRING AVENUE	X	X		X		
PS255	SOUTHEAST	6820 FAIT AVENUE	X	X		X		
PS256	CALVIN RODWELL	3501 HILLSDALE ROAD		X		X		
PS260	FREDERICK	2501 FREDERICK AVENUE				X		
PS261	LOCKERMAN-BUNDY	301 N. PULASKI STREET		X		X		
PS301	WILLIAM S. BAER ELEMENTARY	2001 WARWICK AVENUE	X	X		X		
PS303	UPTON	811 W. LANVALE	X	X		X		
PS304	HARBOR VIEW ELEMENTARY	4301 10TH AVENUE	X	X	X			
PS307	CLAREMONT ELEMENTARY	5301 ERDMAN AVENUE	X	X		X		

BALTIMORE CITY SCHOOL MANAGEMENT PLAN LIST

ASBESTOS-CONTAINING BUILDING MATERIALS (ACBM) INVENTORY BY BUILDING

BULDING NUMBER *	BUILDING NAME	ADDRESS	FRIABLE ACBM	NON-FRIABLE ACBM	ASSUMED FRIABLE ACBM	ASSUMED NON-FRIABLE ACBM	NO ACBM FOUND	NO SUSPECT MATERIAL
PS310	FERNHILL ELEMENATRY	3915 FERNHILL AVENUE		X		X		
PS313	LOIS T. MURRAY	1600 E. ARLINGTON AVENUE		X		X		
PS314	SHARP-LEADENHALL	150 W. WEST STREET		X		X		
PS315	DR. LILLIE M. JACKSON	1501 ASBURTON STREET		X		X		
PS353A	WOODBURN CENTER	1301 WOODBURN AVE	X	X				
PS400	EDMONDSON	501 N. ATHOL AVENUE	X	X		X		
PS401	NORTHWESTERN	6900 PARK HEIGHTS AVENUE	X	X		X		
PS402	NORTHERN	2201 PINEWOOD AVENUE	X	X		X		
PS403	COB POLYTECH #403	1400 COLDSPRING LANE	X	X		X		
PS405	PATTERSON	100 KANE STREET	X	X		X		
PS406	FOREST PARK	3401 ELDORADO AVENUE		X		X		
PS407	WESTERN	4600 FALLS ROAD	X	X		X		
PS410	MERGENTHALER	3500 HILLEN ROAD	X	X		X		
PS412	SOUTHWESTERN	200 FONTHILL AVENUE	X			X		
PS413	HARBOR CITY LEARNING CTR.	4801 LIBERTY HEIGHTS AVE.	X	X		X		
PS414	PAUL LAURENCE DUNBAR	1400 ORLEANS STREET	X	X		X		
PS415	SCHOOL FOR THE ARTS	706-712 CATHEDRAL STREET	X	X	X	X		
PS420	WEST SIDE SKILLED CENTER	4501 EDMONDSON AVENUE (R)	X	X		X		
PS450	FREDERICK DOUGLAS	2301 GWYNNS FALLS PARKWAY	X			X		
PS451	JOSEPH C. BRESCOE	5506 W. BIDDLE SREET	X	X		X		
PS453	FAIRMOUNT HILL	100 N. ANN STREET	X	X		X		
PS454	CARVER	2201 PRESSTMAN STREET	X	X		X		
PS456	HARFORD INSTITUTE	2555 HARFORD ROAD	X	X		X		
PS457	LAURENCE G. PAQUIN	2200 SINCLAIR LANE		X		X		
PS480	BALTIMORE CITY COLLEGE	3220 THE ALAMEDA	X	X		X		
PS504	REPAIR SHOP	1230 E. 20th ST.	X	X		X		
PS513	KID'S DINER	SARATOGA & HOLIDAY					X	
PS525	WAREHOUSE	1149 E. GRANBY ST.		X				
PS526	XPORTATION GARAGE & OFFICE	1210 E. 20th ST.	X	X		X		
PS534	ELECTRICAL SHOP	1812 GREENMOUNT AVENUE	X	X				
PS540	SCHOOL HEADQUARTERS	200 E. NORTH AVE.					X	
PS556	GROUNDS SHOP	2614 PENNSYLVANIA AVENUE	X	X				
PS557	OFFICE WAREHOUSE (#557)	2200 ROBB STREET	X	X		X		
PS564	BUS XPORTATION GARAGE&OFF.	1601 BRADDISH AVE.		X		X		
PS564A	BUS XPORTATION GARAGE&OFF.	1601 BRADDISH AVE.		X				
PS701	KIRK AV. STADIUM	KIRK & EXETER HALL AVE.	X					

* EACH BUILDING NUMBER IN THIS TABLE REPRESENTS A SEPERATE BUILDING FOR WHICH A MANAGEMENT PLAN WAS PRODUCED. BUILDING NUMBERS ENDING IN "A", "B", etc. REPRESENT AUXILIARY BUILDINGS ON THE SITE OF THE MAIN BUILDING.

APPENDIX C

RESPONSE ACTION SCHEDULE

SCHOOL NAME: Mount Washington Elementary School

NUMBER: PS 221

RESPONSE ACTIONS PER FUNCTIONAL SPACE

FUNCTIONAL SPACE No.	DATE START	DATE OF COMPLETION
01	9/1/89	5/31/90
02 Restrict Access	7/1/96	7/1/97
05	9/1/89	5/31/90
06	7/1/91	7/1/92
07	7/1/91	7/1/92
08	7/1/91	7/1/92
09	7/1/91	7/1/92
10	7/1/91	7/1/92
11	9/1/89	5/31/90
12	9/1/89	5/31/90

All spaces listed above or included in table 9-1 of the management plan.

Start O&M (Operations & Maintenance) activities on July 9, 1989.

O&M activities in each functional space shall be ongoing until the building is renovated or demolished.

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

AIR MONITORING DATA SHEET

Project: Mt Washington Elem #221
Address: 1801 Mulgrave Ave
Date: 1-24-92
Activity: Air Monitoring
Job Number: MA2-717
Work Order Number:

SAMPLED FOR:

	METHOD	CASSETTE	FILTER
☑ Asbestos:	~~400~~ ☐ TEM	☐ 25mm ☐ 37mm	☑ MCE ☐ PC
☐ Airborne Dust:			
☐ Gas:			
☐ Vapor:			
☐ Other:			

Analytical Method: _____ Ambient Temp.: _____

Protection Worn During Sampling:

	Employee	IH
Full Body Coveralls	☑	☑
Respirator - Air Purifying	☑	☑
Respirator - Power Air Purifying	☐	☐
Respirator - Supplied Air	☐	☐

PERSONAL SAMPLING DATA

Employee Sampled:
Social Security Number:
Smoker: ☐ Yes ☐ No
Job Function:
Description of Activity:

Signature of Employee:

LAB ID	SAMPLE NO.	SAMPLE DATE	RESULTS ~~FIBERS/cc~~ s/mm	SAMPLE LOCATION
9201947	MWSE-8	1-24-92	<61	FINAL TEM AIR SAMPLE - INSIDE THE WORK AREA, CRAWL SPACE ALONG THE NORTH WALL
9201948	MWSE-9	"	<61	FINAL TEM AIR SAMPLE - INSIDE THE WORK AREA, CRAWL SPACE ALONG THE SOUTH WALL
9201949	MWSE-10	"	<61	FINAL TEM AIR SAMPLE - INSIDE THE WORK AREA, CRAWLSPACE, ALONG THE EAST WALL
9201950	MWSE-11	"	<61	FINAL TEM AIR SAMPLE - INSIDE THE WORK AREA, CRAWL SPACE ALONG THE WEST WALL
9201951	MWSE-12	"	<61	FINAL TEM AIR SAMPLE - INSIDE THE WORK AREA, CRAWL SPACE CENTER OF WORK AREA
9201952	MWSE-13	"	N/A	FINAL TEM AIR SAMPLE - OUTSIDE THE WORK AREA
9201953	MWSE-14	"	N/A	FINAL TEM AIR SAMPLE - OUTSIDE THE WORK AREA

FIELD SAMPLE NUMBER	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING START (LITERS/MIN.)	FLOW RATE SETTING STOP (LITERS/MIN.)	VOLUME LITERS	SAMPLE TYPE AMBIENT	SAMPLE TYPE AREA	SAMPLE TYPE FINAL	SAMPLE TYPE PERSONAL	SAMPLE LOCATION IN WORK AREA	SAMPLE LOCATION OUTSIDE WORK AREA	SAMPLE LOCATION N/A	INSTRUMENT SERIAL NUMBER
MWSE-8	1227	1440	133	10.0	10.0	1330			✓		✓			GAST-0111
MWSE-9	1227	1440	133	10.0	10.0	1330			✓		✓			GAST-0160
MWSE-10	1227	1440	133	10.0	10.0	1330			✓		✓			GAST-0168
MWSE-11	1227	1440	133	10.0	10.0	1330			✓		✓			GAST-0117
MWSE-12	1227	1440	133	10.0	10.0	1330			✓		✓			GAST-0118
MWSE-13	1240	1455	135	10.0	10.0	1350			✓			✓		GAST-0125
MWSE-14	1240	1455	135	10.0	10.0	1350			✓			✓		GAST-0155

Comments: N/A - Not Analyzed

Inspector: STEPHEN B EPPS
(PRINT NAME)
Stephen B Epps
(SIGNATURE)
Date: 1-24-92

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

AIR MONITORING DATA SHEET

Project: Mt Washington Elem #221
Address: 1801 Sulphare Ave
Date: 1-24-92
Activity: Air Monitoring
Job Number: MAZ-7170
Work Order Number:

SAMPLED FOR:

	METHOD	CASSETTE	FILTER
☑ Asbestos:	☑ 7400 ☑ TEM	☑ 25mm ☐ 37mm	☑ MCE ☐ PC
☐ Airborne Dust:			
☐ Gas:			
☐ Vapor:			
☐ Other:			

Analytical Method: _____ Ambient Temp.: _____

Protection Worn During Sampling:

	Employee	IH
Full Body Coveralls	☑	☑
Respirator - Air Purifying	☑	☑
Respirator - Power Air Purifying	☐	☐
Respirator - Supplied Air	☐	☐

PERSONAL SAMPLING DATA

Employee Sampled:
Social Security Number:
Smoker: ☐ Yes ☐ No
Job Function:
Description of Activity:

Signature of Employee:

LAB ID	SAMPLE NO.	SAMPLE DATE	RESULTS ~~FIBERS/cc~~ s/mm²	SAMPLE LOCATION
9201954	MWSE-15	1-24-92	N/A	FINAL TEM AIR SAMPLE - OUTSIDE THE WORK AREA
9201955	MWSE-16	"	N/A	FINAL TEM AIR SAMPLE - OUTSIDE THE WORK AREA
9201956	MWSE-17	"	N/A	FINAL TEM AIR SAMPLE - OUTSIDE THE WORK AREA
9201957	MWSE-18	"	N/A	INSIDE AREA BLANK
9201958	MWSE-19	"	N/A	OUTSIDE WORK AREA BLANK
9201959	MWSE-20	"	N/A	LAB BLANK

FIELD SAMPLE NUMBER	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING START (LITERS/MIN.)	FLOW RATE SETTING STOP (LITERS/MIN.)	VOLUME LITERS	SAMPLE TYPE AMBIENT	AREA	FINAL	PERSONAL	SAMPLE LOCATION IN WORK AREA	OUTSIDE WORK AREA	N/A	INSTRUMENT SERIAL NUMBER
MWSE-15	1240	1455	135	10.0	10.0	1350			✓			✓		GAST-0158
MWSE-16	1240	1455	135	10.0	10.0	1350			✓			✓		GAST-0153
MWSE-17	1240	1455	135	10.0	10.0	1350			✓			✓		GAST-0139
MWSE-18						0			✓				✓	BLANK
MWSE-19						0			✓				✓	BLANK
MWSE-20						0			✓				✓	BLANK

Comments: NA = Not Analyzed

Inspector: STEPHEN B EPPS (PRINT NAME)
Stephen B Epps (SIGNATURE)
Date: 1-24-92

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

AIR MONITORING DATA SHEET

Project: Mt Washington Elem #22
Address: 1801 Sulgrave Ave
Date: 1-24-92
Activity: Air Monitoring
Job Number: A142-717
Work Order Number:

SAMPLED FOR:

	METHOD	CASSETTE	FILTER
☑ Asbestos:	☑ 7400 ☐ TEM	☐ 25mm ☐ 37mm	☐ MCE ☐ PC
☐ Airborne Dust:			
☐ Gas:			
☐ Vapor:			
☐ Other:			

Analytical Method: _____ Ambient Temp.: _____

Protection Worn During Sampling:

	Employee	IH
Full Body Coveralls	☒	☑
Respirator - Air Purifying	☒	☒
Respirator - Power Air Purifying	☐	☐
Respirator - Supplied Air	☐	☐

PERSONAL SAMPLING DATA

Employee Sampled:
Social Security Number:
Smoker: ☐ Yes ☐ No
Job Function:
Description of Activity:

Signature of Employee:

LAB ID	SAMPLE NO.	SAMPLE DATE	RESULTS FIBERS/CC	SAMPLE LOCATION
20477	MNSE-21	1-24-92	0.090	PRELIMINARY AIR SAMPLE - INSIDE WORK AREA CRAWLSPACE #2 ~~GROUND FLOOR~~ 2ND FL

FIELD SAMPLE NUMBER	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING START (LITERS/MIN.)	FLOW RATE SETTING STOP (LITERS/MIN.)	VOLUME LITERS	SAMPLE TYPE AMBIENT	SAMPLE TYPE AREA	SAMPLE TYPE FINAL	SAMPLE TYPE PERSONAL	SAMPLE LOCATION IN WORK AREA	SAMPLE LOCATION OUTSIDE WORK AREA	SAMPLE LOCATION N/A	INSTRUMENT SERIAL NUMBER
MNSE-21	1530	1900	210	3.5	3.5	735		✓			✓			SKC-0121

Comments:

Inspector: STEPHEN B EARS (PRINT NAME)
Stephen B Egan (SIGNATURE)
Date: 1-24-92

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

CHAIN OF CUSTODY FOR MICROSCOPY SERVICES

3415

Submittal Date: 1-24-92 Submitted By: (Print) STEPHEN B EPPS (Sign) Stephen B Epps

Client Name: Rincon of Maryland Project Name: Mt Washington Elem #221

Address: 7796 Ford Bordton Rd Address: 1801 Sulgrave Ave Baltimore Maryland 21

Telephone: (410) 796-5991 Contact Person: Mike Stein

Results Required By: 1 / 24 / 92 Before Noon? ☐ Yes ☐ No

Number of Samples: 7

Type of Samples: ☑ Air ☐ Bulk ☐ Wipe ☐ Other: _____

Release Criteria: ☐ AHERA ☑ 0.010 f/cc ☐ % Asbestos ☐ Other: _____

LAB ID	SAMPLE NUMBER	DATE	VOLUME (Liters)	METHOD (Check) PCM	PLM	TEM	SEM	OTHER
20440	MWSE-1	1-24-92	1500	✓				finish
20441	MWSE-2	↓	1500	✓				↓
20442	MWSE-3		1500	✓				
20443	MWSE-4		1500	✓				
20444	MWSE-5		1500	✓				
20445	MWSE-6		0	✓				field blank
20446	MWSE-7	↓	0					lab blank

Relinquished By: (Signature)	Date	Relinquished By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time
Received By: (Signature)	Date	Received By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time

LABORATORY STAFF ONLY: (CUSTODY)

1. Date/Time Received 1 / 24 / 92 @ 1230 by (Print) STEPHEN B EPPS Sign Stephen B Epps
2. Date/Time Analyzed 1 / 24 / 92 @ 1235 by (Print) _____ Sign _____
3. Date/Time Reported 1 / 24 / 92 @ 1320 by (Print) _____ Sign _____
4. Results Reported To Mark Stein by (Print) _____ Sign _____

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

CHAIN OF CUSTODY FOR MICROSCOPY SERVICES

3416

Submittal Date: 1-24-92 Submitted By: (Print) STEPHEN B EPPS (Sign) Stephen B Epps

Client Name: Marcor of Maryland

Address: 7196 Sand Barbara Rd

Telephone: (410) 796-5991

Project Name: Ft Washington Plaza #221

Address: 1801 Belgrade Ave
Baltimore, Maryland

Contact Person: Mark Stein

Results Required By: 1 / 28 / 92

Before Noon? ☐ Yes ☐ No

Number of Samples: 13

Type of Samples: ☑ Air ☐ Bulk ☐ Wipe ☐ Other: _____

Release Criteria: ☑ AHERA ☐ 0.010 f/cc ☐ % Asbestos ☐ Other: _____

LAB ID	SAMPLE NUMBER	DATE	VOLUME (Liters)	METHOD (Check) PCM	PLM	TEM	SEM	OTHER
	MWSE-8	1-24-92	1330			✓		inside the
	MWSE-9		1330			✓		work area
	MWSE-10		1330			✓		
	MWSE-11		1330			✓		
	MWSE-12		1330			✓		
	MWSE-13		1350			✓		outside work
	MWSE-14		1350			✓		
	MWSE-15		1350			✓		
	MWSE-16		1350			✓		
	MWSE-17		1350			✓		
	MWSE-18		0			✓		inside Blank
	MWSE-19		0			✓		outside Blank
	MWSE-20		0			✓		lab Blank

Relinquished By: (Signature)	Date	Relinquished By: (Signature)	Date
Stephen B Epps	1-24-92		
Name: (Printed) STEPHEN B EPPS	Time 1530	Name: (Printed)	Time
Received By: (Signature)	Date	Received By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time

LABORATORY STAFF ONLY: (CUSTODY)

1. Date/Time Received ___/___/___ @ _____ by (Print) _____ Sign _____
2. Date/Time Analyzed ___/___/___ @ _____ by (Print) _____ Sign _____
3. Date/Time Reported ___/___/___ @ _____ by (Print) _____ Sign _____
4. Results Reported To _____ by (Print) _____ Sign _____

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

3417

CHAIN OF CUSTODY FOR MICROSCOPY SERVICES

Submittal Date: 1-24-92 Submitted By: (Print) STEPHEN B EPPS (Sign) Stephen B Epps

Client Name: Thalcan of Maryland

Address: 7796 Sand Bank Rd

Telephone: (410) 796-5991

Project Name: Mt Washington Elem # 221

Address: 1801 Sulgrave Ave
Baltimore, Maryland 21209

Contact Person: Mark Stein

Results Required By: ___/___/___ Before Noon? ☐ Yes ☐ No

Number of Samples: 1

Type of Samples: ☑ Air ☐ Bulk ☐ Wipe ☐ Other: _____

Release Criteria: ☐ AHERA ☑ 0.010 f/cc ☐ % Asbestos ☐ Other: _____

LAB ID	SAMPLE NUMBER	DATE	VOLUME (Liters)	METHOD (Check)				OTHER
				PCM	PLM	TEM	SEM	
20477	MWSE-8 21	1-24-92	735	✓				

Relinquished By: (Signature)	Date	Relinquished By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time
Received By: (Signature)	Date	Received By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time

LABORATORY STAFF ONLY: (CUSTODY)

1. Date/Time Received 1/24/92 @ 1900 by (Print) STEPHEN B EPPS Sign Stephen B Epps
2. Date/Time Analyzed 1/24/92 @ 1905 by (Print) ↓ ↓ Sign ↓ ↓
3. Date/Time Reported ___/___/___ @ _____ by (Print) _____ Sign _____
4. Results Reported To _____ by (Print) _____ Sign _____

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

FINAL ABATEMENT CHECKLIST

Building: Mt Washington Elementary #221 Date: 1-24-92

Location: 1801 Sulgrave Ave Baltimore, Maryland 21209

Project Description: Patch and repair of damaged pipe and fitting insulation located in Basement Crawlspace #1

Company Performing Abatement: Marcor of Maryland

Inspector: STEPHEN B EPPS Signature: Stephen B Epps

Title: Industrial Hygienist

Accompanied By: N/A Title: N/A

Time of Inspection: Start: 0900 Stop: 1015

A. VISUAL INSPECTION OF WORK AREA

The following areas have been wet cleaned and/or H.E.P.A. vacuumed and seen to contain no residual dust and debris:

WORK SITE INSPECTION	Acceptable	Not Applicable	Problem Encountered / Comments
1. Floors	☑	☐	
2. Walls	☑	☐	
3. Window Ledges	☐	☑	
4. Pipes:			
a. Vertical	☑	☐	
b. Horizontal	☑	☐	
b. Pipe Hangers	☑	☐	
5. Ventilaton Equipment	☑	☐	
6. Ducts	☑	☐	
7. Registers	☐	☑	
8. Lights	☑	☐	
9. Conduit and Wires	☑	☐	
10. Sprinkler Heads	☐	☑	
11. Fire Alarms	☐	☑	
12. Electrical Panels and Boxes	☐	☑	
13. All Other Horizontal Surfaces	☑	☐	
14. All Other Vertical Surfaces	☑	☐	
15. Removal Equipment Remaining In Work Area	☑	☐	
16. Areas Adjacent To Work Site Barrier	☑	☐	

B. ENCAPSULATION

1. Has encapsulant been used? ☑ Yes ☐ No
2. Name of encapsulant used: Foster 32-32 and 32-22

(Complete Page Two)

Date: 1-24-92

C. Have all bags of removal debris been properly labeled and removed from work area? ☑ Yes ☐ No

D. FINAL AIR SAMPLING MWSE-1, MWSE-2, MWSE-3, MWSE-4, MWSE-5, FIELD BLANK

1. Sample I.D. Number(s): MWSE-6, MWSE-7 (LAB BLANK)
2. Were samples analyzed on site? ☑ Yes ☐ No
3. If yes, person performing analysis: STEPHEN B EPPS Title: INDUSTRIAL HYGIENIST
4. Was a blank submitted? ☑ Yes ☐ No
5. Is electron microscopy required? ☑ Yes ☐ No
6. What is the specified clearance level? (f/cc)? 0.010
7. Were microtraps run during the taking of final air samples ☑ Yes ☐ No
8. Were any other aggressive sampling techniques used? ☐ Yes ☑ No

Describe: _____

E. RESULTS OF VISUAL INSPECTION

The work area was found to be acceptably free of residual dust and debris: ☑ Yes ☐ No

Inspector: STEPHEN B EPPS Signature: Stephen B Epps

Date: 1-24-92 Time: 10 15

F. RESULTS OF AIR TEST(s)

The results of final air tests	Sample I.D.	Result (f/cc)	Sample I.D.	Result (f/cc)
	MWSE-1	0.007	MWSE-5	0.009
	MWSE-2	<0.005	MWSE-6	2.5 FIBERS PER 100 FLDS
	MWSE-3	0.005	MWSE-7	0 FIBERS PER 100 FLDS
	MWSE-4	<0.005		

Are these results below the final clearance level? ☑ Yes ☐ No

Has the work area been released? ☐ Yes ☑ No

Notification Given To: Mark Stein Title: Maron Supervisor

Date and Time of Notification: 1-24-92 1320

Microscopist: STEPHEN B EPPS Signature: Stephen B Epps

G. Has the contractor been informed to clean all contamination left behind barriers? ☑ Yes ☐ No

H. Final Cleanliness Specification: 0.010 fibers/cc prepared by: Baltimore City

Has analysis of final samples met specified level of cleanliness? ☑ Yes ☐ No

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

FINAL ABATEMENT CHECKLIST

Building: Mt Washington Elementary #221 Date: 1-24-92

Location: 1801 Sulgrave Ave Baltimore, Maryland 21209

Project Description: Patch and repair of damaged pipe and fitting insulation located in Basement Crawlspace #1

Company Performing Abatement: Thurcon of Maryland

Inspector: Stephen B. Epps Signature: Stephen B Epps

Title: Industrial Hygienist

Accompanied By: N/A Title: N/A

Time of Inspection: Start: 0900 Stop: 1015

A. VISUAL INSPECTION OF WORK AREA

The following areas have been wet cleaned and/or H.E.P.A. vacuumed and seen to contain no residual dust and debris:

WORK SITE INSPECTION	Acceptable	Not Applicable	Problem Encountered / Comments
1. Floors	☑	☐	
2. Walls	☑	☐	
3. Window Ledges	☐	☑	
4. Pipes:			
a. Vertical	☑	☐	
b. Horizontal	☑	☐	
b. Pipe Hangers	☑	☐	
5. Ventilaton Equipment	☑	☐	
6. Ducts	☑	☐	
7. Registers	☐	☑	
8. Lights	☑	☐	
9. Conduit and Wires	☑	☐	
10. Sprinkler Heads	☐	☑	
11. Fire Alarms	☐	☑	
12. Electrical Panels and Boxes	☐	☑	
13. All Other Horizontal Surfaces	☑	☐	
14. All Other Vertical Surfaces	☑	☐	
15. Removal Equipment Remaining In Work Area	☑	☐	
16. Areas Adjacent To Work Site Barrier	☑	☐	

B. ENCAPSULATION

1. Has encapsulant been used? ☑ Yes ☐ No
2. Name of encapsulant used: Foster 32-32 and 32-22

(Complete Page Two)

Date: 1-24-92

C. Have all bags of removal debris been properly labeled and removed from work area? ☑ Yes ☐ No

D. FINAL AIR SAMPLING

1. Sample I.D. Number(s): MWSE-8, MWSE-9, MWSE-10, MWSE-11, MWSE-12, MWSE-13, MWSE-14, MWSE-15, MWSE-16, MWSE-17, MWSE-18, MWSE-19, MWSE-20
2. Were samples analyzed on site? ☐ Yes ☑ No
3. If yes, person performing analysis: _____ Title: _____
4. Was a blank submitted? ☑ Yes ☐ No
5. Is electron microscopy required? ☑ Yes ☐ No
6. What is the specified clearance level? (f/cc)? ~~0.015~~ < 70 s/mm²
7. Were microtraps run during the taking of final air samples ☑ Yes ☐ No
8. Were any other aggressive sampling techniques used? ☐ Yes ☑ No

   Describe: _____

E. RESULTS OF VISUAL INSPECTION

The work area was found to be acceptably free of residual dust and debris: ☑ Yes ☐ No

Inspector: STEPHEN B EPPS Signature: Stephen B Epps

Date: 1-24-92 Time: 1015

F. RESULTS OF AIR TEST(s)

The results of final air tests

Sample I.D.	Result ~~(f/cc)~~ s/mm²	Sample I.D.	Result ~~(f/cc)~~ s/mm²
MWSE-8	< 61	MWSE-14	NA
MWSE-9	< 61	MWSE-15	NA
MWSE-10	< 61	MWSE-16	NA
MWSE-11	< 61	MWSE-17	NA
MWSE-12	< 61	MWSE-18	NA
MWSE-13	NA	MWSE-19	NA
		MWSE-20	NA

Are these results below the final clearance level? ☑ Yes ☐ No

Has the work area been released? ☑ Yes ☐ No

Notification Given To: MARK STEIN Title: Supervisor

Date and Time of Notification: 1/28/92 - 1:15

Microscopist: Andreas Saldivar Signature: SEE AMA Report

G. Has the contractor been informed to clean all contamination left behind barriers? ☑ Yes ☐ No

H. Final Cleanliness Specification: ~~0.010~~ < 70 s/mm² fibers/cc prepared by: Baltimore City

Has analysis of final samples met specified level of cleanliness? ☑ Yes ☐ No

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

DAILY OBSERVATIONS

DATE: Jan 27, 1992

INSPECTOR: Perry D Cooper

SITE: B221 - Mt. Washington Elem
1808 Sulgrave Ave.
Balto MD

TITLE: IH

PURPOSE OF VISIT:

Air monitoring and inspection of the crawlspace workarea.

GENERAL OBSERVATIONS:

Setup of the crawlspace on the 1st floor opposite rooms 1, 2, and 3 is in progress. Six mil poly is being installed around the exterior walls on the floor. The job scope is to patch and repair approx 1300 linear feet of pipe insulation. Approximately 400 linear feet of pipe insulation is on the ground. Marcor will pick up the gross debris, patch and repair the damaged insulation then encapsulate the entire crawlspace with penetrating encapsulant.

Two air samples were collected. One in the crawlspace at its entrance, the other outside room #2 in the hallway.

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

DAILY OBSERVATIONS

DATE: Jan 27, 1992 INSPECTOR: Perry L Cope

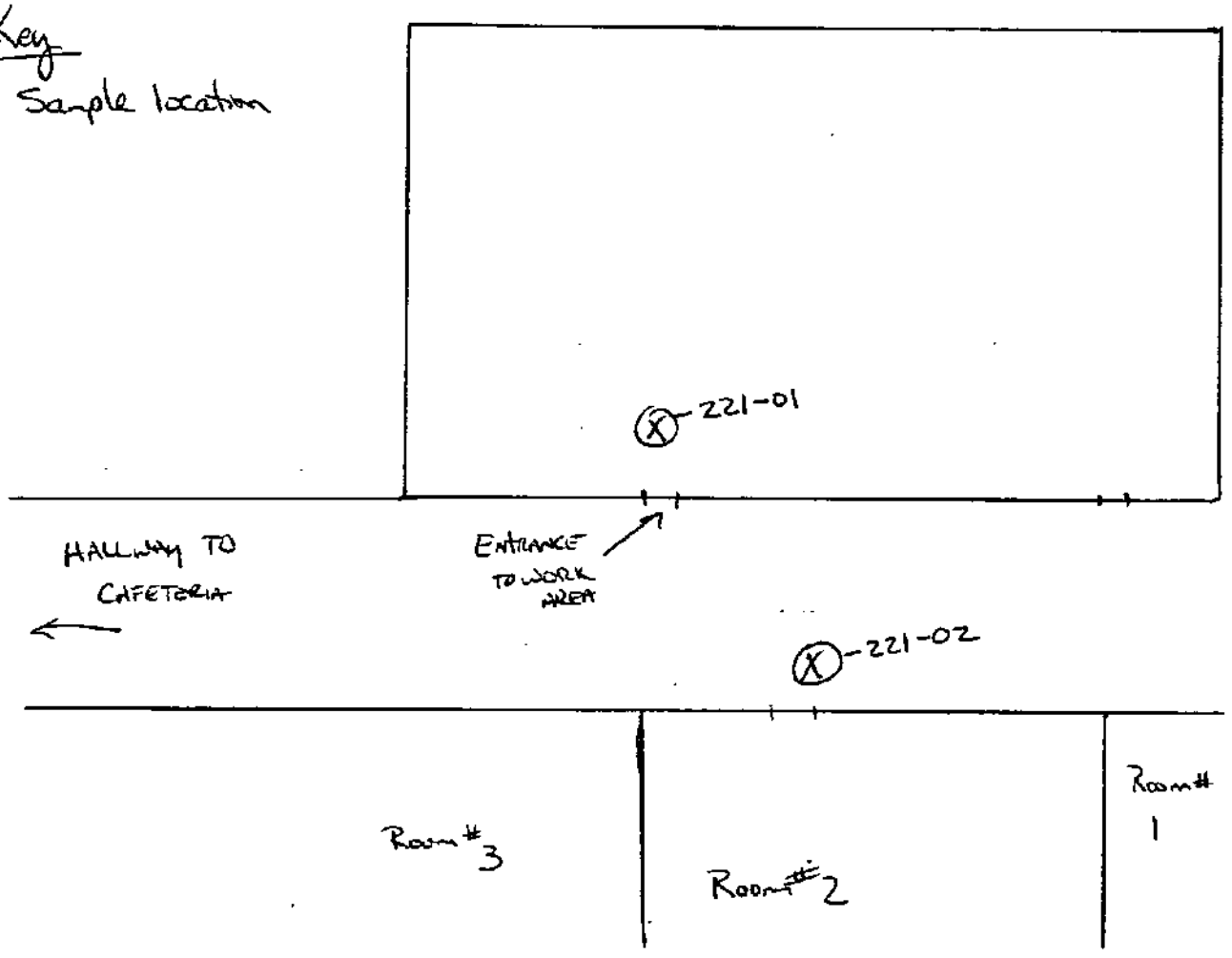
SITE: B221 Mt Washington Elem TITLE: Industrial Hygienist
608 Sulgrave Ave
Baltimore, MD

PURPOSE OF VISIT:

Air monitoring and inspection of the crawlspace work area

GENERAL OBSERVATIONS:

Key
⊗ Sample location



I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

AIR MONITORING DATA SHEET

Project: PS221 Mt. Washington Elem.
Address: 1808 Sulgrave Ave Balto MD
Date: 1-27-92
Activity: Setup in crawlspace
Job Number: MA2-717
Work Order Number:

SAMPLED FOR:

	METHOD	CASSETTE	FILTER
[X] Asbestos:	[X] 7400 [ ] TEM	[X] 25mm [ ] 37mm	[X] MCE [ ] PC
[ ] Airborne Dust:			
[ ] Gas:			
[ ] Vapor:			
[ ] Other:			

Analytical Method: _____ Ambient Temp.: _____

Protection Worn During Sampling:

	Employee	IH
Full Body Coveralls	[X]	[/]
Respirator - Air Purifying	[X]	[/]
Respirator - Power Air Purifying	[ ]	[ ]
Respirator - Supplied Air	[ ]	[ ]

PERSONAL SAMPLING DATA

Employee Sampled: N/A
Social Security Number:
Smoker: [ ] Yes [ ] No
Job Function:
Description of Activity:

Signature of Employee:

LAB ID	SAMPLE NO.	SAMPLE DATE	RESULTS FIBERS/CC	SAMPLE LOCATION
20447	221-01	1-27-92	0.20	I.W.A. at entrance to crawlspace
20448	221-02	1-27-92	<0.005	O.W.A. in hall outside door to room

FIELD SAMPLE NUMBER	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING START (LITERS/MIN.)	FLOW RATE SETTING STOP (LITERS/MIN.)	VOLUME LITERS	SAMPLE TYPE AMBIENT	SAMPLE TYPE AREA	SAMPLE TYPE FIXED	SAMPLE TYPE PERSONAL	SAMPLE LOCATION IN WORK AREA	SAMPLE LOCATION OUTSIDE WORK AREA	SAMPLE LOCATION N/A	INSTRUMENT SERIAL NUMBER
221-01	1103	1404	181	2.0	2.0	362		X			X			0181
221-02	1107	1404	177	12.0	12.0	2124		X				X		0111

Comments:

Inspector: Peggy P Cooper (PRINT NAME)
Peggy P Cooper (SIGNATURE)
Date: 1-27-92

I H SERVICES, INC.

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PHONE: (301) 644-9400
FAX (301) 644-9402

CHAIN OF CUSTODY FOR MICROSCOPY SERVICES

3776

Submittal Date: 1-27-92 Submitted By: (Print) Perry D Cooper (Sign) Perry D Cooper

Client Name: Marco

Project Name: B221 Mt Washington Elem.

Address:

Address: Sulgrave Ave
Balto MD

Telephone: ( )

Contact Person:

Results Required By: 1 / 28 / 92

Before Noon? ☐ Yes ☐ No

Number of Samples:

Type of Samples: ☒ Air ☐ Bulk ☐ Wipe ☐ Other:

Release Criteria: ☐ AHERA ☒ 0.010 f/cc ☐ % Asbestos ☐ Other:

LAB ID	SAMPLE NUMBER	DATE	VOLUME (Liters)	METHOD (Check) PCM	PLM	TEM	SEM	OTHER
20447	221-01	1-27-92	362	X				
10446	02		2124	X				

Relinquished By: (Signature)	Date	Relinquished By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time
Received By: (Signature)	Date	Received By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time

LABORATORY STAFF ONLY: (CUSTODY)

1. Date/Time Received 1 / 27 / 92 @ 1430 by (Print) Sign
2. Date/Time Analyzed 1 / 24 / 92 @ 1045 by (Print) Sign
3. Date/Time Reported 1 / 28 / 92 @ 1530 by (Print) Sign
4. Results Reported To M. Ste. by (Print) Sign

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

DAILY OBSERVATIONS

DATE: Jan 28, 1992

INSPECTOR: Perry D Cooper

SITE: B 221 Mt. Washington Elem
1808 Sulgrave Ave
Baltimore, MD

TITLE: Industrial Hygienist

PURPOSE OF VISIT:

Air monitoring and inspection of work areas

GENERAL OBSERVATIONS:

Marcor received clearance for the first crawlspace where work was performed. They began to remove all containment barriers and decontin. The workers entered the work area with tyvek and respirators on.

One sample was collected outside the work area near the engineers desk during this tear down work.

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

DAILY OBSERVATIONS

DATE: Jan 28, 1992

INSPECTOR: Perry D Cooper

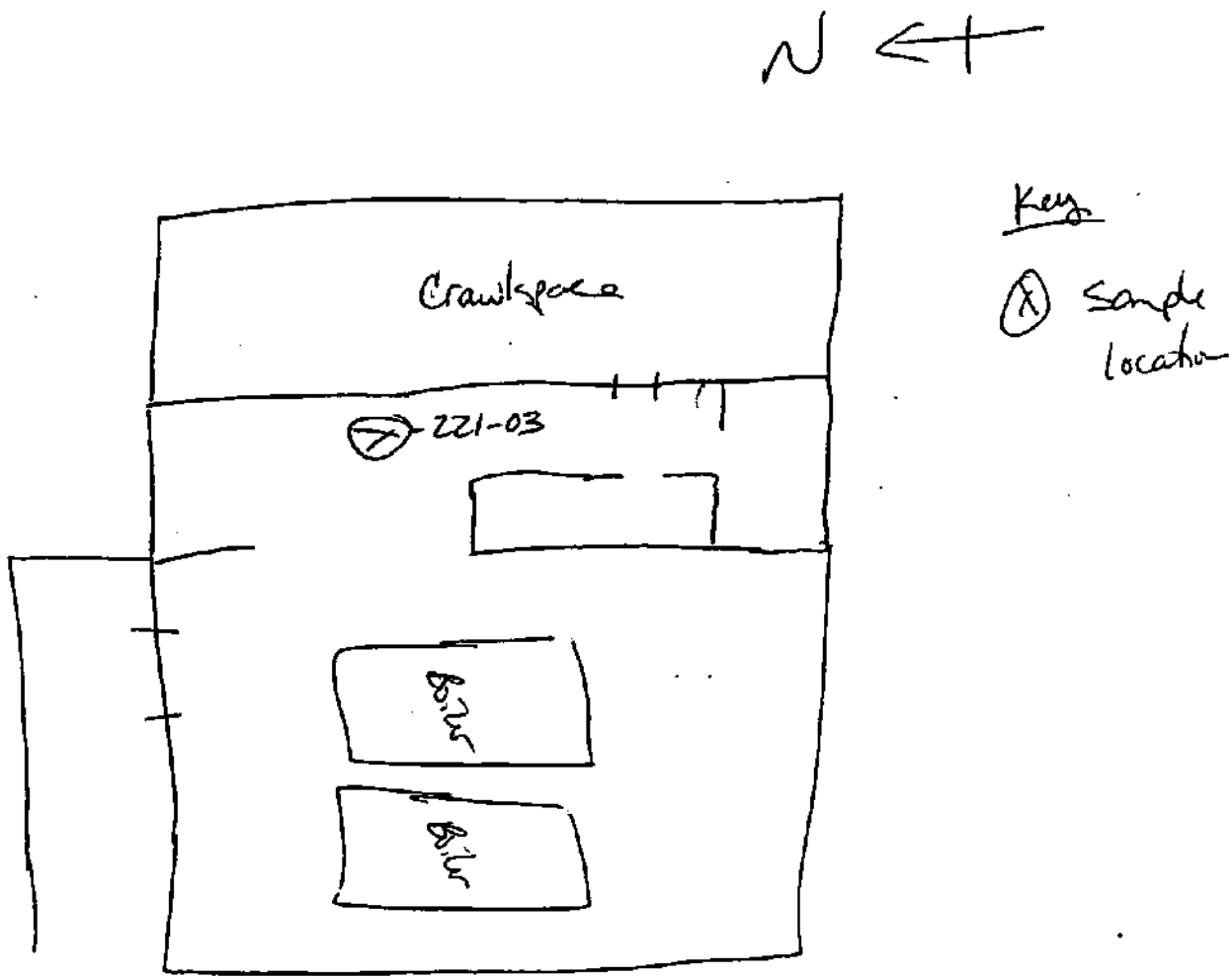
SITE: PS 221 Mt. Washington Elem
1808 Sulgrave Ave
Balto MD

TITLE: I H

PURPOSE OF VISIT:

Boiler Room

GENERAL OBSERVATIONS:



IH SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

AIR MONITORING DATA SHEET

Project: PS 221 Mt. Washington Elem
Address: 1808 Sulgrave Ave Balt MD
Date: 1-28-92
Activity: Tear down
Job Number: MHA 707
Work Order Number:

SAMPLED FOR:

	METHOD	CASSETTE	FILTER
☑ Asbestos:	☑ 7400 ☐ TEM	☑ 25mm ☐ 37mm	☑ MCE ☐ PC
☐ Airborne Dust:			
☐ Gas:			
☐ Vapor:			
☐ Other:			

Analytical Method: _____ Ambient Temp.: _____

Protection Worn During Sampling:

	Employee	IH
Full Body Coveralls	☑	☑
Respirator - Air Purifying	☑	☑
Respirator - Power Air Purifying	☐	☐
Respirator - Supplied Air	☐	☐

PERSONAL SAMPLING DATA

Employee Sampled:
Social Security Number:
Smoker: ☐ Yes ☐ No
Job Function:
Description of Activity:

Signature of Employee:

LAB ID	SAMPLE NO.	SAMPLE DATE	RESULTS FIBERS/CC	SAMPLE LOCATION
20474	221-03	1-28-92	0.029	outside work area on duct near engineers office
20475	221-04	1-28-92	0 f/b / 100 f/d/y	Blank
20476	221-05	1-28-92	0 f/b / 100 f/d/y	Blank

FIELD SAMPLE NUMBER	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING START (LITERS/MIN.)	FLOW RATE SETTING STOP	VOLUME LITERS	SAMPLE TYPE AMBIENT	SAMPLE TYPE AREA	SAMPLE TYPE FINAL	SAMPLE TYPE PERSONAL	SAMPLE LOCATION IN WORK AREA	SAMPLE LOCATION OUTSIDE WORK AREA	SAMPLE LOCATION N/A	INSTRUMENT SERIAL NUMBER
03	1332	1710	218	2.0	2.0	416		X				X		0181
04														
05														

Comments:

Inspector: Terry D Cooper (PRINT NAME)
Terry D Cooper (SIGNATURE)
Date: 1-28-92

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

CHAIN OF CUSTODY FOR MICROSCOPY SERVICES

3777

Submittal Date: Jan 28, 92 Submitted By: (Print) Perry D Cooper (Sign) Perry D Cooper

Client Name: Marco

Project Name: PS 221 Mt Washington Elem

Address:

Address: 1806 Belgrave Ave Balto MD 21

Telephone: ( )

Contact Person: Mark Stein

Results Required By: 1, 29, 92

Before Noon? ☐ Yes ☐ No

Number of Samples:

Type of Samples: ☒ Air ☐ Bulk ☐ Wipe ☐ Other:

Release Criteria: ☐ AHERA ☒ 0.010 f/cc ☐ % Asbestos ☐ Other:

LAB ID	SAMPLE NUMBER	DATE	VOLUME (Liters)	METHOD (Check) PCM	PLM	TEM	SEM	OTHER
20474	221-03	1-28-92	416	X				
20485	04	↓	0					
20486	05	↓	0					

Relinquished By: (Signature)	Date	Relinquished By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time
Received By: (Signature)	Date	Received By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time

LABORATORY STAFF ONLY: (CUSTODY)

Date/Time Received 1, 28, 92 @ 1730 by (Print) P. Cooper Sign

Date/Time Analyzed 1, 29, 92 @ 945 by (Print) Sign

Date/Time Reported 1, 29, 92 @ 1330 by (Print) Sign

Results Reported To M Stein by (Print) Sign

I H SERVICES, INC.
1521 Edgewood Street — Suite J • Baltimore, Maryland 21227
PHONE: (301) 644-9400
FAX (301) 644-9402

DAILY OBSERVATIONS

DATE: 1-29-92

INSPECTOR: Perry Cooper

SITE: PS 221 Mt Washington Elem
1808 Sulgrave
Balto MD

TITLE: Ind. Hygienist

PURPOSE OF VISIT:

Air monitoring and inspection of the crawlspace

GENERAL OBSERVATIONS:

Marco began connecting the flexduct to the negative air machines. There is approximately 40'@ duct in the area and it is still not enough to reach the outside for exhaust.

A truck came to remove waste bags from the previous work area.

Three air samples were taken. One inside the work area at the decon, and two samples in the hall outside room 2 and 3.

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

DAILY OBSERVATIONS

DATE: 1-29-92

INSPECTOR: P Cooper

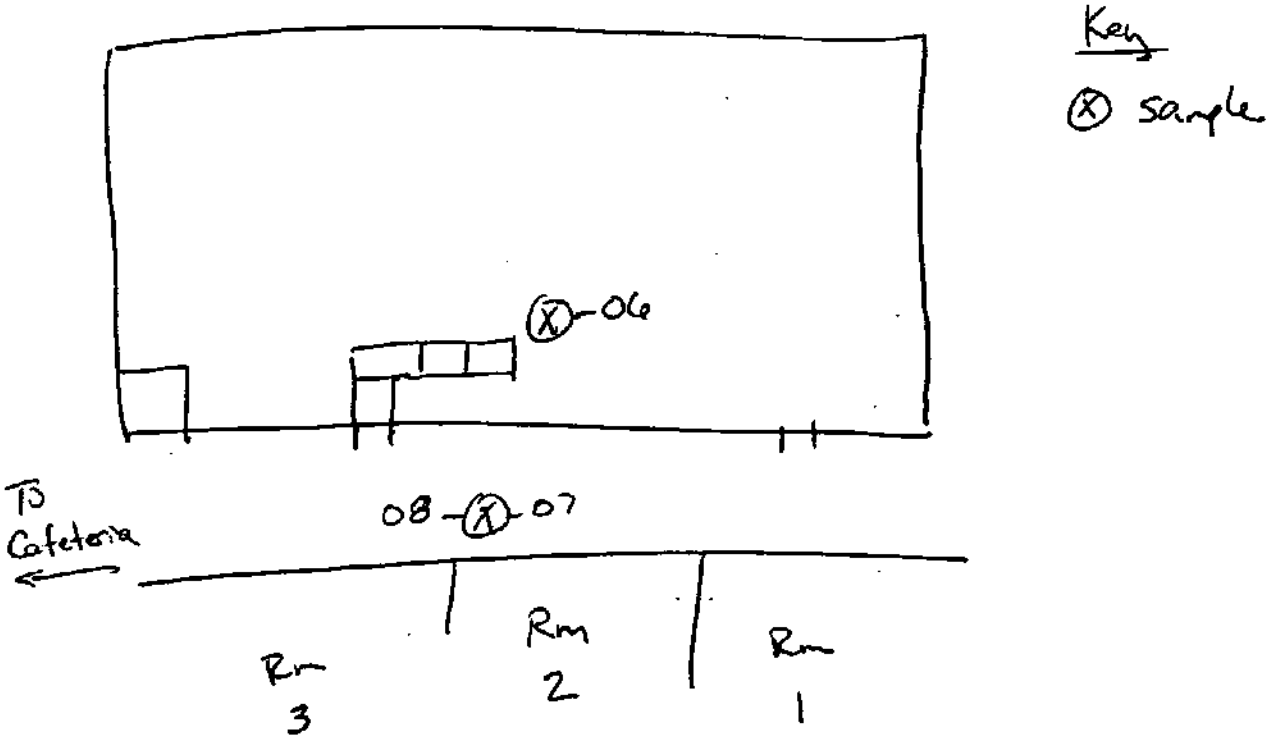
SITE: PS 221 Mt. Washington Elem
5008 Sulgrave
Baltimore MD

TITLE: IH

PURPOSE OF VISIT:

CRAWLSPACE

GENERAL OBSERVATIONS:



IH SERVICES, INC.
1521 Edgewood Street — Suite J • Baltimore, Maryland 21227
PHONE: (301) 644-9400
FAX (301) 644-9402

AIR MONITORING DATA SHEET

Project: PS221 Mt. Washington Elem
Address: 1806 Sulgrave Baltimore Md
Date: 1-29-92
Activity: Setup
Job Number: MA2-717
Work Order Number:

SAMPLED FOR:

	METHOD	CASSETTE	FILTER
☒ Asbestos:	☒ 7400 ☐ TEM	☒ 25mm ☐ 37mm	☐ MCE ☐ PC
☐ Airborne Dust:			
☐ Gas:			
☐ Vapor:			
☐ Other:			

Analytical Method: _____ Ambient Temp.: _____

Protection Worn During Sampling:

	Employee	IH
Full Body Coveralls	☒	☒
Respirator - Air Purifying	☒	☒
Respirator - Power Air Purifying	☐	☐
Respirator - Supplied Air	☐	☐

PERSONAL SAMPLING DATA

Employee Sampled: _____
Social Security Number: _____
Smoker: ☐ Yes ☐ No
Job Function: _____
Description of Activity: _____
Signature of Employee: _____

LAB ID	SAMPLE NO.	SAMPLE DATE	RESULTS FIBERS/CC	SAMPLE LOCATION
	221-06	1-29-92	VOID	IWA
20485	221-07	4	0.06	OWA at Room 2
20486	221-08	4	0.014	OWA at Room 2

FIELD SAMPLE NUMBER	TEST PERIOD START	TEST PERIOD STOP	TEST PERIOD TOTAL (MIN.)	FLOW RATE SETTING START (LITERS/MIN.)	FLOW RATE SETTING STOP	VOLUME LITERS	SAMPLE TYPE AMBIENT	SAMPLE TYPE AREA	SAMPLE TYPE FINAL	SAMPLE TYPE PERSONAL	SAMPLE LOCATION IN WORK AREA	SAMPLE LOCATION OUTSIDE WORK AREA	SAMPLE LOCATION N/A	INSTRUMENT SERIAL NUMBER
06	1507	~~1623~~	~~76~~	2.0	2.0	~~152~~		X						0181
07	1507	1623	76	12	12	912		X						0111
08	1623	1723	60	12	12	700		X						0111

Comments: _____

Inspector: Percy D Cooper (PRINT NAME)
Percy D Cooper (SIGNATURE)
Date: 1-29-92

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

CHAIN OF CUSTODY FOR MICROSCOPY SERVICES

3778

Submittal Date: 1-29-92 Submitted By: (Print) Perry D Cooper (Sign) Perry D Cooper

Client Name: Mascon

Project Name: PS 221 Mt Washington Elem

Address:

Address: 1808 Sulgrave Baltimore MD

Telephone: ( )

Contact Person: Mark Stein

Results Required By: 1 / 30 / 92

Before Noon? ☐ Yes ☑ No

Number of Samples:

Type of Samples: ☑ Air ☐ Bulk ☐ Wipe ☐ Other:

Release Criteria: ☐ AHERA ☑ 0.010 f/cc ☐ % Asbestos ☐ Other:

LAB ID	SAMPLE NUMBER	DATE	VOLUME (Liters)	METHOD (Check) PCM	PLM	TEM	SEM	OTHER
VOID	221-06	1-29-92	VOID	X				
20475	07	↓	912	X				
20476	08	↓	720	X				

Relinquished By: (Signature)	Date	Relinquished By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time
Received By: (Signature)	Date	Received By: (Signature)	Date
Name: (Printed)	Time	Name: (Printed)	Time

LABORATORY STAFF ONLY: (CUSTODY)

1. Date/Time Received 1 / 29 / 92 @ 1730 by (Print) _____ Sign _____
2. Date/Time Analyzed 1 / 30 / 92 @ 1100 by (Print) P. Cooper Sign P. Cooper
3. Date/Time Reported 1 / 30 / 92 @ 1330 by (Print) _____ Sign _____
4. Results Reported To M. Stein by (Print) _____ Sign _____

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

DAILY OBSERVATIONS

DATE: 1-30-92

INSPECTOR: Terry D Cooper

SITE: B221 Mt. Washington Elem
1008 Sulgrave Ave
Balto MD

TITLE: Industrial Hygienist

PURPOSE OF VISIT:

Air monitoring and inspection.

GENERAL OBSERVATIONS:

4 Marcon entered the work area and began patching and repairing the damaged ACM.

I began 1 sample in the work area. Two samples were collected in the hall.

I H SERVICES, INC.

1521 Edgewood Street — Suite J • Baltimore, Maryland 21227

PHONE: (301) 644-9400
FAX (301) 644-9402

DAILY OBSERVATIONS

DATE: 1-30-92

INSPECTOR: P. Cooper

SITE: B 221 Mt. Washington Elem
1808 Sulgrave Ave
Balto MD

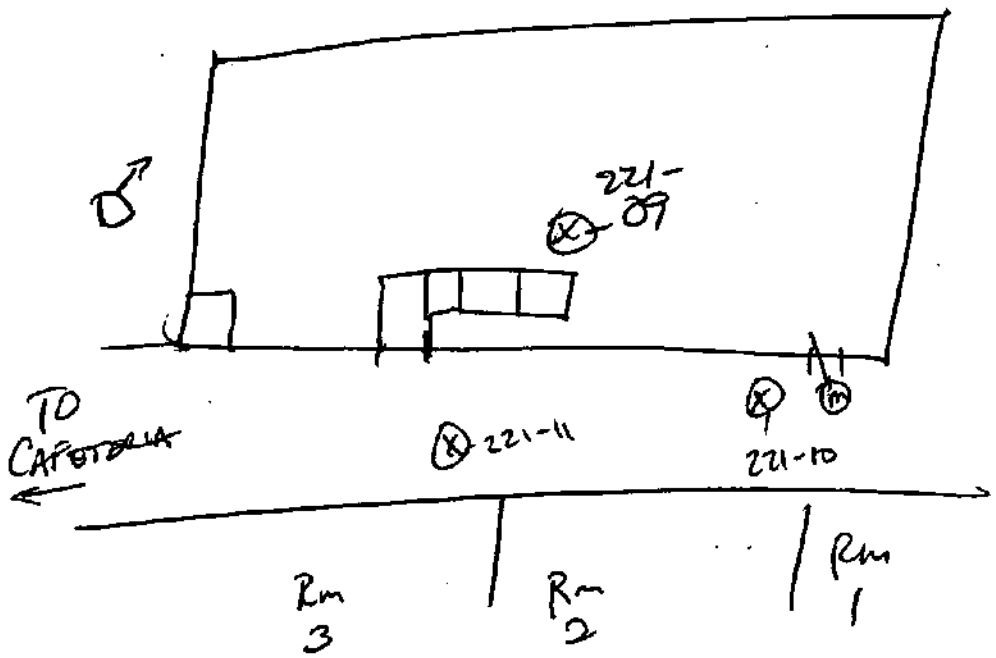
TITLE: IH

PURPOSE OF VISIT:

Crawlspace #2

GENERAL OBSERVATIONS:

Key
(X) Sample
(m) manometer



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PRE-ABATEMENT CHECKLIST

Building: B221 Mt. Washington Elem Date: 1-30-98

Location: 808 Sulgrave Ave Balt MD

Project Description: Patch & Repair pipe insulation and pick up debris in crawlspace

Company Performing Abatement: Marco

Supervisor on Job: Mark Stein Title: Supervisor

Performance Specification Prepared By: Balto City

Final Cleanliness Specification: DOD Prepared By: Balto City

WORK SITE PREPARATION	Acceptable	Not Applicable	Problem Encountered/Comments
A. AREA NON-ACCESSIBLE TO GENERAL PUBLIC	☒	☐	
B. SIGNAGE			
1. Proper caution signs at entrances and exits	☒	☐	
2. Dumpster Labeled	☐	☒	
C. AIRLOCK-DECONTAMINATION AREA			
1. Clean Room - 1st Stage			
a. Lockers/clothing storage provided	☒	☐	
b. Double plastic flaps at entrance and exit	☒	☐	
2. Shower Area - 2nd Stage			
a. Shower operating	☒	☐	
b. Shower waste water properly filtered	☒	☐	
c. Double plastic flaps at entrance and exit	☒	☐	
d. Clean towels available	☒	☐	
3. Equipment Room - 3rd Stage			
a. Double plastic flaps at entrance and exit	☒	☐	
b. Labeled bag for disposal of used suits	☒	☐	
D. PERIMETER BARRIER PREPARATION			
1. 6 mil plastic used	☒	☐	
2. Floor plastic (2 layers)	☐	☒	
3. Wall plastic	☒	☐	
4. Proper sealing of:			
a. Doors	☒	☐	
b. Windows	☐	☒	
c. Ventilation Systems	☐	☒	
1. Vents	☐	☒	
2. Ducts	☐	☒	
3. Grills	☐	☒	
4. System turned off	☒	☐	
d. Pipes and conduit	☒	☐	
e. Light fixtures	☒	☐	
f. Sprinkler Heads	☐	☒	
g. All other openings into work area	☒	☐	
5. Penetrations through ceiling properly sealed	☒	☐	

(complete page two)

PRE-ABATEMENT CHECKLIST

Date: 1-30-92

E. ABATEMENT EQUIPMENT

1. H.E.P.A. Filtered Vacuums
   a. Number of units: 3
   b. Type: 2 wet/dry 1 other
2. H.E.P.A. Ventilation Units 4
   a. Number of units: _____
   b. Type: Mini
   c. Operating: ☑ Yes ☐ No
   d. H.E.P.A. filters present: ☑ Yes ☐ No
   e. Exhausted out of work area: ☑ Yes ☐ No
   f. Negative pressure inside work area:

Measurement	Inches H_2O	Location
#1 _____	.02"	_____
#2 _____	_____	_____
#3 _____	_____	_____

3. Water hoses present ☑ Yes ☐ No
4. Amended water sprayers present ☑ Yes ☐ No
5. Surfactant present ☑ Yes ☐ No
6. Type of encapsulant to be used 22 and 32
7. Any other equipment to be used _____

F. WORKER PROTECTION

1. Respiratory Protection
   a. Type of respirators to be used: ½ face neg. pressure
   b. Are respirators NIOSH/MSHA approved? ☑ Yes ☐ No
2. If jurisdiction requires licensing, do all workers have proper identification to perform asbestos removal? ☑ Yes ☐ No
3. Proper Protective Clothing
   ☑ Full body coveralls ☐ Hard Hats
   ☑ Head covers ☐ Eye protecton
   ☑ Foot covers ☐ _____
4. Proper area for changing, eating, resting? ☑ Yes ☐ No

G. VERIFICATION OF WASTE DISPOSAL SITE ☑ Yes ☐ No

Name and Location: AL-Rang

H. AUTHORIZATION TO PROCEED:

Date: 1-30-92 Time: 13:30

Inspector: Perry D Cooper Signature: Perry D Cooper

Title LH

Authorization Given To: Mark Stein

Witness(es): _____